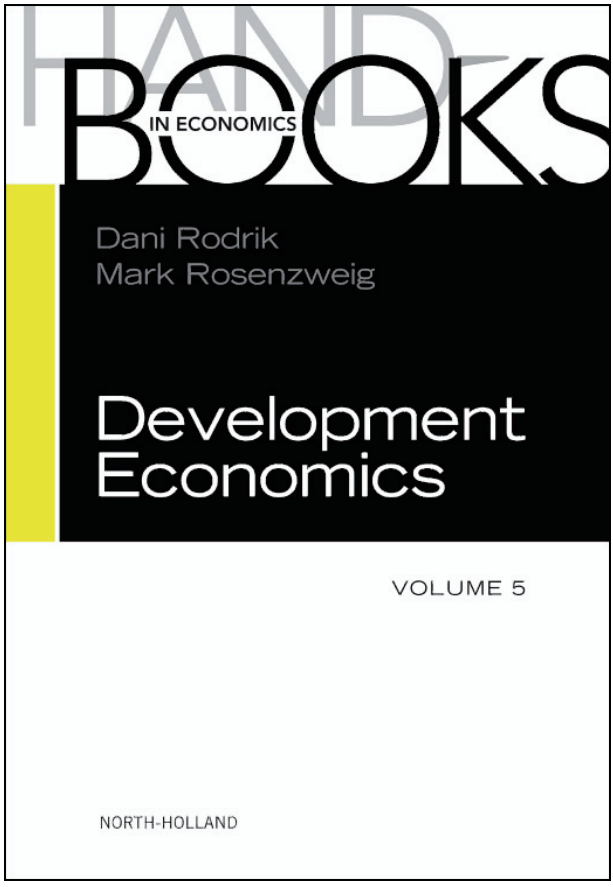

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CHAPTER 68

Property Rights and Economic Development*

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Contents

Abstract

This chapter develops a unified analytical framework, drawing on and extending the existing literature on the subject, for studying the role of property rights in economic development. It addresses two fundamental and related questions concerning the relationship between property rights and economic activity. (i) What are the mechanisms through which property rights affect economic activity? (ii) What are the determinants of property rights? In answering these, it surveys some of the main empirical and theoretical ideas from the extensive literature on the topic.

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1. INTRODUCTION

The term *property right* refers to an owner's right to use a good or asset for consumption and/or income generation (referred to as "use rights"). It can also include the right to transfer it to another party, in the form of a sale, gift, or bequest (referred to as "transfer rights"). A property right also typically conveys the right to contract with other parties by renting, pledging, or mortgaging a good or asset, or by allowing other parties to use it, for example, in an employment relationship.[1]

While the classical economists, from Smith to Marx, accorded a central position to the role of property rights (or, "relations of production") in the process of economic development, it is only recently that mainstream economics has come around to this point of view. The core welfare results of economics concerning the role of competitive markets assume that property rights are well defined and costlessly enforced. The literature on economic growth has traditionally focused on savings and capital accumulation in an institution-free world with perfect property rights.

The new institutional approach to development economics (North, 1990) has, however, put concerns about effective property rights at the centre of thinking about development, recognizing that this requires an explicit departure from a frictionless world. According to North:

> **Institutions are the rules of the game in a society, or more formally, are the humanly devised constraints that shape human interaction. In consequence, they structure incentives in human exchange, whether political, social, or economic.**

Seen from this perspective, property rights are an important element of the institutional structure of an economy. However, property rights are not exogenously given—they evolve over time, driven by economic and political forces. Therefore, a study of property rights also requires consideration of the arrangements, both formal and informal, that ensure that property rights are well defined and enforced. Recent advances in political economy have given greater prominence to the role of the state in codifying and protecting such rights.[2]

By property rights economists typically refer to *private* property rights a key feature of which is being able legally to exclude others from using a good or asset. This affects resource allocation by shaping the incentives of individuals to carry out productive activities involving the use of the good or asset, undertake investments that maintain or enhance its value, and also, to trade or lease it for other uses.[3]

However, other forms of property rights, such as communal property rights, are important in many societies.[4] In the case of common property, such as a lake or a forest, individuals have use rights but do not have the right to exclude others from using it. There are also assets where the transfer rights of owners are circumscribed. For example, slavery is prohibited in modern economies. In general, property rights (both use rights

and transfer rights) are always circumscribed—for example, the owner of a plot of land is does not have the right to carry out illegal activities on it. The nature of these restrictions depends on the political, legal, and enforcement system in place at a particular time and place.

When unpacking these ideas, it quickly becomes clear that there are many important facets of property rights which go to the heart of how economies work and give incentives for individuals and firms to make productive investments. The term effective property rights refer to a number of economically relevant concepts. First and foremost, it refers to the fact that ownership structures (whether collective or individual) are well defined. This has a first-order impact on the distribution of wealth and consumption. By the same token, property rights affect the pattern of production by influencing who has use rights to an asset and allowing separation of ownership from control. Thus the depth and nature of rental markets depend on the development of property rights. Such rights also affect the inter-generational evolution of the wealth distribution, by having an impact on whether assets can be transferred from parents to children. Rights may also affect the development of markets, particularly credit markets, to the extent assets can be pledged against default.

An important conceptual issue concerns the relationship between contracts and property rights. Both specify a set of decision rights: rights to take some actions or to proscribe others. In a world with perfect contracting, a rental contract is effectively equivalent to a change in ownership because these rights can be specified for every foreseeable contingency. This idea lies at the heart of the celebrated Coase theorem (Coase, 1960): in a world with complete information and no contracting costs, resource allocation will be independent of the allocation of property rights.

In a world with costly contracting, owning and renting are not equivalent since not all uses of a good or asset can be specified for all eventualities up front. A corollary of this is the idea that property rights convey *residual* control rights to the owner (Hart, 1995). These rights represent a source of freedom to those who hold them, allowing them to decide what he or she would like to do with the object (subject to any legal or technical constraints). This will also affect the holder's incentives to invest in enhancing the value of the asset, as well as those of others who might also have contractual rights to use the asset.

This chapter develops a unified analytical framework, contributing to and drawing on the existing literature on the subject, to address two fundamental and related questions concerning the relationship between property rights and economic development. (i) What are the mechanisms through which property rights affect economic activity? (ii) What are the determinants of property rights? In each case, the aim of the chapter is to survey the main ideas in the field rather than to provide an exhaustive review of the literature.

In terms of the first question, we emphasize four main aspects of how property rights affect economic activity.[5] The first is expropriation risk—insecure property rights imply that individuals may fail to realize the fruits of their investment and efforts. Second, insecure property rights lead to costs that individuals have to incur to defend their property which, from the economic point of view, is unproductive. The third is failure to facilitate gains from trade—a productive economy requires that assets are used by those who can do so most productively and improvements in property rights facilitate this. In other words, they enable an asset's mobility as a factor of production (e.g., via a rental market). The fourth is the use of property in supporting other transactions. Modern market economies rely on collateral to support a variety of financial market transactions and improving property rights may increase productivity by enhancing such possibilities. We will explore these arguments and discuss some of the relevant empirical evidence.

As far as the second question goes, the contribution of the chapter is to explore how systems of property rights are created and evolve over time. To understand this requires an appreciation of the gainers and losers from such rights and the institutions that shape the process by which rights are created and destroyed. Here, we look at lessons from history as well as contemporary experiences.[6]

This chapter is organized as follows. In Section 2, we take a microeconomic approach to studying how property rights affect resource allocation in theory. We use this approach as a basis for reviewing some of the empirical evidence on how property rights affect household behavior. We also review some general equilibrium implications of property rights improvements. Section 3 then discusses endogenous property rights. We look in detail at forces that shape expropriation risk. We also discuss investing resources to improve state effectiveness in improving property rights. Section 4 offers some concluding comments.

2. RESOURCE ALLOCATION AND PROPERTY RIGHTS

In this section, we examine in detail the key economic arguments about the economic role of property rights and how they affect productivity. In this section, we unify and extend the arguments for secure property rights studied in Besley (1995). We classify the various channels through which property rights affect efficiency of resource allocation under two broad categories: first, limiting expropriation, and second, facilitating market transactions. The former includes two subcategories: enhancing investment incentives by limiting expropriation risk, and reducing the need to divert private resources to protect property. The latter too includes two subcategories: facilitating trade in assets and improving collateralizability of assets, thereby facilitating credit transactions. We will discuss both individual behavioral responses as well as general

equilibrium implications. We will also discuss the insights from the literature on the property rights approach to the theory of the firm, which suggests a theory of optimal allocation of property rights.

2.1 The role of property rights in limiting expropriation

2.1.1 The basic model

We begin with a very simple set up which will allow us to illustrate a series of arguments very transparently. We begin by looking at a single producer economy. For the moment, we assume that there are no markets or any form of exchange. To fix ideas, think of this as a farmer who is endowed with a quantity of land.

We work with a very simple stochastic output model where the farmer commits effort (time) $e \in [0, 1]$ of which he has an endowment $\overline{e} \leq 1$. This yields output A with probability $\sqrt{e}$ and zero with probability $1 - \sqrt{e}$. Expected output y is therefore:

$$y = A\sqrt{e}. \tag{1}$$

In this single input setting, the farmer's decision is to choose his optimal level of e. Since there are no labor markets, this choice will be driven by his own disutility cost of supplying labor.

We assume that the farmer's utility function is linear in consumption (c) and leisure (l):

$$u(c, l) = c + l. \tag{2}$$

This formulation rules out income effects and risk aversion.

We assume that property rights are imperfect in the sense that there is an exogenously given probability $\tau \in [0, 1]$ of expropriation. This could apply to the output that is produced, or the land which is needed to produce output. These are equivalent, so long as labor is a sunk input prior to whether or not there is going to be expropriation.[7]

Given this formulation, expected consumption is $c = (1 - \tau)A\sqrt{e}$. At this stage, we make no distinction between expropriation and taxation nor do we consider the choice of τ. The implicit assumption, which we will make more precise later, is that there is an actor in the economy with coercive power which can be used to tax, confiscate, or steal. In Section 3, we discuss the factors that determine the choice of τ.

The producer selects e to maximize:

$$(1 - \tau)A\sqrt{e} + \overline{e} - e \tag{3}$$

subject to the constraint $e \leq \overline{e}$. The first-order condition for an interior solution is:

$$\frac{(1 - \tau)A}{2\sqrt{e}} = 1. \tag{4}$$

The optimal choice of labor of the producer is therefore given by:

$$e^* = \left[\frac{(1-\tau)A}{2}\right]^2. \tag{5}$$

Since we require that $e \leq 1$, we assume throughout that $A \leq 2$. Correspondingly, (expected) gross output is $y(\tau) = ((1-\tau)A^2)/2$, and the producer's net surplus (taking into account the cost of e) is given by $\pi(\tau) = [(1-\tau)A/2]^2 + \bar{e}$. Using this, we have the following observation:

Result 1. *Labor supply, output and profits are strictly decreasing in* τ.

This is really only like a standard model in which taxes create a disincentive to commit effort. In this risk neutral setting, it also does not matter whether τ is a fixed or known proportion of output, as with a tax or a probability of full expropriation of all output. This result underpins the standard "security" argument in favor of property rights which allow lower τ. The same logic would extend to other inputs such as fertilizer or land improvements.

There are three key assumptions that drive this result. First, the input is sunk before the farmer knows whether there is going to be expropriation or not. Second, more efficient instruments for transfer are not available. Therefore, as with any form of outcome-contingent transfer policy, there is a standard disincentive effect. A lump-sum tax or a "profit-tax" would benefit both the farmer and the coercive authority.[8] Third, the resource-endowment constraint (here, labor) is not binding.

To explore the importance of the latter, suppose that the resource constraint is binding, that is, $e^* = \bar{e}$. In this case, gross output is $A\sqrt{\bar{e}}$, and the producer's net surplus is $(1-\tau)A\sqrt{\bar{e}}$. At this corner solution, marginal changes in τ have only distributional implications: labor supply and gross output are unaffected.

If competitive labor markets exist, then resource constraints are unlikely to be binding.[9] To see this, suppose that e can be sold in the market with $w = 1$. We would get the same outcome in terms of productive efficiency in the benchmark model irrespective of the specific form of preferences of the producer, or his endowments, such as $\bar{e}$. In particular, the outcome will be the same whether or not the labor endowment constraint binds. If, for example, $e^* \geq \bar{e}$ the producer would hire in labor from the labor market.[10] The effect of τ would, of course, stay the same: like a tax, it distorts labor usage.

2.1.2 Guard labor

In the basic model, there is only one margin of choice: how much labor to put into production. Suppose now that labor can also be used to reduce the risk of expropriation. This potentially creates an additional margin of distortion caused by imperfect property rights. Poor property rights not only reduce incentives to supply productive

labor, it also diverts resources (here labor) from productive to unproductive uses. Improvements in the protection of property rights can then free up labor and enable households to make unconstrained decisions.

There are two cases to consider. First, where the asset that is subject to insecure property rights is involved in the production or income-generation process, as in our basic model. A good example of this is agricultural land. Second, where the asset subject to insecure property rights is not directly involved in the production or income-generation process. Residential property is a good example of this.

To explore this, we modify the model by having two types of labor. Let $e_1 \in [0, 1]$ denote "productive" labor and $e_2 \in [0, 1]$ denote "guard" labor that reduces the probability of expropriation. We use a simple technology to describe the probability of expropriation: $\tau(1 - \gamma\sqrt{e_2})$, where $\tau \in [0, 1]$ and $\gamma \in [0, 1]$. This captures very simply the idea that expropriation is lower if e_2 is higher with γ representing the effectiveness of efforts put into guard labor. Otherwise the model is the same as the basic model, with $A\sqrt{e_1}$ denoting expected output. Now the producer's decision problem is:

$$\max_{e_1,e_2} \left(1 - \tau\left(1 - \gamma\sqrt{e_2}\right)\right) A\sqrt{e_1} + \overline{e} - e_1 - e_2. \tag{6}$$

Solving the first-order conditions for both effort choices yields:

$$e_1 = \left(\frac{2(1-\tau)A}{4 - (\tau\gamma A)^2}\right)^2 \text{ and } \quad e_2 = \left(\frac{\gamma\tau(1-\tau)A^2}{4 - (\tau\gamma A)^2}\right)^2. \tag{7}$$

Several interesting implications follow immediately from these two expressions:[11]

Result 2. *If the insecure asset is involved in the production process, then in the case where the resource constraint is not binding: (i) improved property rights (lower τ) increases productive labor; (ii) there exists $\overline{\tau} \leq 1$ such that guard labor is increasing in τ so long as $\tau \leq \overline{\tau}$ and decreasing otherwise; and (iii) economic efficiency is increasing in improved property rights (lower τ).*

This result says that the link between productive labor and secure property rights remains. However, the effect of property rights security on guard labor is ambiguous in sign.[12]

The intuition for this finding is as follows. As productive and guard labor are *complementary*, more effort to protect property rights will raise the expected marginal returns from efforts to produce more output.[13] Formally, e_1 is increasing in γ, and so compared to the basic model, introducing guard labor increases productive labor. Given this, there are two effects of increasing τ on e_1 as can be seen from the first-order condition. The direct effect is negative for the same reasons as in the basic model. But there is an indirect effect operating via e_2 in the presence of guard labor. However, this

effect is always dominated by the direct effect. For (ii) observe that an increase in τ raises the expected marginal return from guard labor while lowering e_1. The complementarity between e_1 and e_2 means that this tends to reduce the expected marginal return from guard labor. For small values of τ the first effect dominates and for larger values of τ, the second effect dominates. However, as one would expect, economic efficiency increases when property rights are more secure following the logic of the previous section: namely, because it is a first-order "tax" on output.

Consider now what happens when the resource (i.e., labor endowment) constraint is binding (i.e., $(1-\tau)^2A^2(4+\tau^2\gamma^2A^2)/(4-\tau^2\gamma^2A^2)^2 > \overline{e}$). Then the first-order conditions are:

$$\begin{aligned}(1-\tau+\tau\gamma\sqrt{e_2})A\frac{1}{2\sqrt{e_1}} &= 1+\lambda,\\ \tau\gamma\frac{1}{2\sqrt{e_2}}A\sqrt{e_1} &= 1+\lambda,\end{aligned} \tag{8}$$

where λ is the Lagrangian multiplier associated with the binding resource constraint (the shadow price of labor). Using these two conditions together with the binding labor-endowment constraint, we obtain the following quadratic equation determining $\sqrt{e_2}$:

$$2\tau\gamma e_2 + (1-\tau)\sqrt{e_2} - \tau\gamma\overline{e} = 0. \tag{9}$$

Solving (and picking the larger root as the smaller root is negative) we obtain:

$$\begin{aligned}e_1 &= \overline{e} - \left[\frac{1}{4\gamma}\left(1-\frac{1}{\tau}\right) + \sqrt{\left\{\frac{1}{4\gamma}\left(1-\frac{1}{\tau}\right)\right\}^2 + \frac{\overline{e}}{2}}\right]^2,\\ e_2 &= \left(\frac{1}{4\gamma}\left(1-\frac{1}{\tau}\right) + \sqrt{\left\{\frac{1}{4\gamma}\left(1-\frac{1}{\tau}\right)\right\}^2 + \frac{\overline{e}}{2}}\right)^2.\end{aligned} \tag{10}$$

It is now straightforward to check that e_2 is always increasing in τ and e_1 is always decreasing in τ. Also, now anything that raises e_2 (e.g., an increase in γ) will directly reduce e_1 via the binding labor-endowment constraint. In this case, productive and guard labor are *substitutes*, and the intuition that guard labor diverts resources away from productive uses applies quite clearly.

We next consider the case where the insecure asset is not involved in the production process. This could apply, for example, if residential property is subject to insecure property rights. This might affect labor supply decisions even though the asset is not directly used for income generation. Suppose the asset is worth $\overline{h}$ to the producer if property rights are not violated and is worth $\overline{h}$ otherwise. As before, let e_1 and e_2 be productive and guard labor. In this case, $A\sqrt{e_1}$ is expected income and $(1-\tau(1-\gamma\sqrt{e_2}))$ is the probability that property rights are not violated. Therefore, the producer's decision is now characterized by:

$$\max_{e_1,e_2}\left(1-\tau\left(1-\gamma\sqrt{e_2}\right)\right)\overline{h}+\tau\left(1-\gamma\sqrt{e_2}\right)\underline{h}+A\sqrt{e_1}+\overline{e}-e_1-e_2. \tag{11}$$

For this case, we have:

Result 3. *If the insecure asset is not involved in the production process, then in the case where the resource constraint is not binding, the productive and guard labor supply decisions are independent and accordingly, e_1 is unaffected by τ.*

If the labor endowment constraint is binding, as before, e_1 and e_2 are substitutes and any reduction in guard labor will increase productive labor. In this case, if τ goes up, then e_2 goes up and therefore e_1 has to go down. Therefore, e_1 is decreasing in τ. If e_1 and e_2 are substitutes in the disutility of labor (e.g., the cost of labor being $e_1+e_2+\phi e_1e_2$ where $\phi>0$) then this effect is further reinforced.

Note, however, that a binding labor-endowment constraint is an issue only when the labor market is imperfect or absent. Otherwise, the opportunity to hire labor at a given wage rate should, in principle, make the cost function linear and separable as is the case when the labor endowment constraint is not binding. However, it may be that there are difficult agency problems in hiring guard labor, that is, preventing the hired guards from appropriating the asset which would need to be considered.

We have abstracted so far from income effects by making the assumption of linear preferences over consumption and leisure. If this is not the case, then there is a further channel through which property rights can affect resource allocation. To see this, consider a slight modification of the above model. Suppose that the insecure asset is not involved in the production process. However, in the utility function of the producer, consumption (e.g., food) and the asset (e.g., consumption value of housing) are complements. The producer then maximizes expected utility as follows:

$$\max_{e_1,e_2}\left(1-\tau\left(1-\gamma\sqrt{e_2}\right)\right)\left(A\sqrt{e_1}\right)^{\alpha}\left(\overline{h}\right)^{\beta}+\tau\left(1-\gamma\sqrt{e_2}\right)\left(A\sqrt{e_1}\right)^{\alpha}\left(\underline{h}\right)^{\beta}+\overline{e}-e_1-e_2, \tag{12}$$

where $\alpha \in (0,1), \beta \in (0,1)$ and $\alpha + \beta < 1$. In this case, the first-order conditions are:

$$\begin{aligned} &\left\{\left(1-\tau\left(1-\gamma\sqrt{e_2}\right)\right)\overline{h}^{\beta}+\tau\left(1-\gamma\sqrt{e_2}\right)\underline{h}^{\beta}\right\}\frac{\alpha}{2}A^{\alpha}(e_1)^{(\alpha/2)-1}=1,\\ &\frac{\tau\gamma}{2\sqrt{e_2}}A^{\alpha}e_1^{\alpha/2}(\overline{h}^{\beta}-\underline{h}^{\beta})=1. \end{aligned} \tag{13}$$

Substituting e_2 from the second equation to the first, and then totally differentiating with respect to τ it is straightforward to verify that $\partial e_1/\partial\tau < 0$ for small values of τ. Thus worsening property rights protection reduces productive effort. The intuition is as follows: the expected marginal return from supplying productive labor falls when τ goes up as consumption is complementary with the asset that is subject to insecure property rights. Clearly, if there is a competitive insurance market then the risk of losing the asset can be insured away, and once again τ will not affect e_1.

To summarize, there is a variety of ways that guard labor supplied in response to insecure property rights can be modeled. Moreover, the theoretical predictions are somewhat sensitive to the case being considered. Thus broad brush conclusions are probably not warranted even though there are a number of reasonable cases where the intuitive idea, that less secure property rights property rights encourages the use of guard labor, emerges from the analysis.

There is a literature that deals with the general equilibrium effects of guard labor (or, more broadly, self-defense) in a model similar to the one above, but with many producers. The key idea is that individual investments in protection entail a negative externality on the other producers as predators are deflected from the protected to the unprotected properties. This implies that the decentralized equilibrium is generally inefficient as it has too much protection.[14]

2.2 Insecure property rights as a barrier to trade

The effects that we have studied so far could be studied in the absence of markets. One key role of property rights is to facilitate exchange and allow producers/consumers to exploit gains from trade. In the following two sections we examine the role of property rights in facilitating exchange in land markets (rental, sales) and in credit markets, respectively.

2.2.1 Property rights and trade in assets

Economic efficiency is enhanced by having assets managed by those who can use them most productively. But this depends on being able to write efficient contracts to trade. In our basic model everyone has the same amount of land, and also, everyone has the same skill level. As a result, so long as there is a competitive labor market, there are no efficiency gains from having a land market. Now we relax this assumption and

allow some agents to have more land than they want to optimally cultivate themselves, and some agents to have less. This creates potential gains from trade via a rental or sales market in land. But a necessary (but not sufficient) condition for this to take place is to have well-defined property rights in land. Otherwise, land will not be offered for rental or sale driven by the fear that lenders could lose the land with some probability, or equivalently, receive only a fraction of the market returns to land due to imperfect property rights in land. This will create an additional margin of distortion due to imperfect property rights. As a consequence, potentially gainful trades will be lost.

To model this in a simple way we assume there is a continuum of agents divided into landed (a fraction of δ) and landless (a fraction $(1 - \delta)$). Suppose that time is infinite and rental contracts involve an up-front payment from the landless farmer to the landlord. However, there is a probability τ of losing ownership of the land at the end of the rental contract which we assume to be one period.

At the beginning of each period a farmer receives a productivity shock $\theta \in \{\underline{\theta}, \overline{\theta}\}$ with $0 \leq \underline{\theta} < \overline{\theta} \leq 1$. Let the probability of low productivity $\theta = \underline{\theta}$ be p. This is assumed to be distributed independently and identically across individuals, as well as over time (for the same individual).

Given θ, output is $\theta A\sqrt{e}$. Therefore, for a given θ, a producer who owns land chooses:

$$\max_{e} \theta A\sqrt{e} + \overline{e} - e. \tag{14}$$

This yields, given perfect property rights (and ignoring corner solutions): $e^* = [\theta A/2]^2$ and $\pi^*(\theta) = [\theta A/2]^2 + \overline{e}$. From now on, we set $\overline{e} = 0$.

For a landless individual or someone who leases out land, there is an alternative activity which could be thought of as working for a wage, that yields utility $\overline{u} \geq 0$. We assume that:

$$\pi^*(\underline{\theta}) > \overline{u}, \tag{15}$$

that is, that any landowner prefers to operate his land to taking the outside opportunity. In this situation, there are clearly gains from trade.

Suppose both landed and landless farmers face the same distribution of productivity shocks. Then there is a fraction $p\delta$ of which is low productivity and landed and a fraction $(1 - p)$ $(1 - \delta)$ which is high productivity and landless. Assume that

$$(1-p)(1-\delta) > p\delta \text{ or } 1 > \delta + p. \tag{16}$$

This says that there are more high productivity and landless than there are low productivity and landed. Given this, in a competitive market, land is scarce and rents will accrue to land owners.

In a perfect rental market land trades at a price

$$r^* = \pi^*(\overline{\theta}) - \overline{u}. \tag{17}$$

All land is fully utilized and has high productivity.

Now let us consider the decision problem when there is a probability τ that the tenant will not return the land. Now we contrast two strategies for a low-productivity landlord: renting out the land and bearing the risk of losing his land or cultivating it himself. As productivity shocks are assumed to be i.i.d. over time, and in any future period when the landowner is lucky and draws $\overline{\theta}$ he would prefer to cultivate the land himself as this way he does not bear the risk of losing it. Following this argument, we can now set up two value functions, one which we call V when in the current period land is rented out, and one which we call W when in the current period the landowner cultivates the land himself. Then,

$$\begin{aligned} V &= \pi^*(\overline{\theta}) + \beta(1-\tau)[(1-p)W + pV], \\ W &= \pi^*(\overline{\theta}) + \beta\,[(1-p)W + pV]. \end{aligned} \tag{18}$$

Solving for W as a function of V yields

$$W = \frac{\pi^*(\overline{\theta}) + \beta pV}{1-\beta(1-p)}. \tag{19}$$

We can now plug W into V, and after some manipulation we obtain

$$V = \frac{1-\beta\tau(1-p)}{1-(1-\tau p)\beta}\pi^*(\overline{\theta}). \tag{20}$$

Observe that V is decreasing in τ, as we would expect.

Consider the autarky option whereby a landowner always cultivates his own land. Let V' and W' denote his lifetime expected payoff from autarky when, respectively, he has a low- and a high-productivity shock in the current period:

$$\begin{aligned} V' &\equiv \pi^*(\underline{\theta}) + \beta\{pV' + (1-p)W'\}, \\ W' &\equiv \pi^*(\overline{\theta}) + \beta\{pV' + (1-p)W'\}. \end{aligned} \tag{21}$$

Solving these, we get:

$$V' = \frac{\pi^*(\underline{\theta})(1-\beta(1-p)) + \beta(1-p)\pi^*(\overline{\theta})}{1-\beta}. \tag{22}$$

Comparing V and V' we can see that if τ is small then $V > V'$ because in the limit when $\tau = 0$, V has to exceed V' as the land is always with a high-productivity producer and the owner gets the full surplus. Consider the opposite case when τ is high. Now there is a trade-off: with autarky there are periods when the land is used unproductively, and with tenancy, there is a risk that the owner may lose the land. Take the extreme case where $\tau = 1$. Now it is easy to check that if

$$\frac{\pi^*(\underline{\theta})}{\pi^*(\overline{\theta})} > \left(1 - \frac{\beta}{1-\beta+\beta p}\right)$$

then $V' > V$. A sufficient condition for this is $\beta > 1/(2-p)$, in which case the right-hand side is negative and so even if $\pi^*(\underline{\theta}) = 0$ the condition would be satisfied. Naturally, if $V' > V$ for $\tau = 1$ by continuity and the fact that V is monotonically decreasing in τ, we have the following result:

Result 4. *If $\beta > 1/(2-p)$, then there is a $\hat{\tau} \in (0,1)$ such that for $\tau \geq \hat{\tau}$ there is no trade in assets and land is cultivated by low-productivity farmers.*

The insecure property rights now lead to no trade and a *per capita* output loss equal to $\delta p[\pi^*(\overline{\theta}) - \pi^*(\underline{\theta})]$. In this case, a fall in τ constitutes a Pareto improvement because those who rent out their land are better off, while those who rent in land are indifferent.

In the case $\pi^*(\underline{\theta}) = 0$ the autarky option, in a period the producer receives a low-productivity shock, is equivalent to keeping the land idle. This is consistent with the fact that in the developing world assets are often kept undeveloped or idle due to insecure property rights.[15] Increasing the security of property rights can therefore reduce the extent to which assets are underutilized.

2.2.2 Property rights and collateralizability of assets

Above, we showed that property rights facilitate trade in assets and thereby achieve efficient allocation of resources. In the presence of agency costs, effective property rights can facilitate the use of assets to mitigate agency costs, thereby facilitating trade. A prime example of this is in the credit market; when agency or enforcement costs are important, lenders may not be willing to lend an efficient amount or, in some cases, lend at all. Property rights improve the ability of borrowers to pledge their assets as collateral, and thereby relax credit constraints.[16]

A recent influential advocate of the importance of this link between property rights and economic efficiency is de Soto (2000, 2001) who calls this the problem of "dead capital." For example, he argues that:

> **What the poor lack is easy access to the property mechanisms that could legally fix the economic potential of their assets so that they could be used to produce, secure, or guarantee greater value in the expanded market. de Soto (2001).**

He proposes the following metaphor:

> **Just as a lake needs a hydroelectric plant to produce usable energy, assets need a formal property system to produce significant surplus value. de Soto (2000, p. 48).**

While de Soto is the modern incarnation of this view, it has an important lineage. For example, in his perceptive study of West African trade, Bauer (1954) also recognizes the importance of poorly developed property rights and the impediment to trade that they create when he observes that:

> **Both in Nigeria and in the Gold Coast family and tribal rights in rural land are unsatisfactory for loans. This obstructs the flow and application of capital to certain uses of high return, which retards the growth of income and hence accumulation. (p. 9).**

To explore these issues, we use the same basic model as above. Thus, $\sqrt{e}$ remains the probability that output is A. We now assume explicitly that $e \in [0, 1]$ is private information to the producer (borrower) and set $\bar{e} = 0$ for simplicity. In addition to committing effort, we now allow the producer to use capital to enhance productivity. For simplicity, capital x is a discrete variable that takes on the values 0 and 1. When $x = 1$, output is $A(1 + \Delta)$ with probability $\sqrt{e}$ and 0 with probability $1 - \sqrt{e}$. Thus, expected output is $A(1 + \Delta)\sqrt{e}$. The cost of a unit of capital is ρ, which for now is exogenously given. We abstract from any direct insecurity of property rights to focus on how they work through the ability to pledge assets. Given this, and absent any frictions, the producer's decision problem is:

$$\max_{e\in(0,1),x\in\{0,1\}} A(1+\Delta x)\sqrt{e} - e - \rho x. \tag{23}$$

The optimal choice of effort, e, is given by:

$$e = \left(\frac{A(1+\Delta x)}{2}\right)^2. \tag{24}$$

In this model the capital good x and effort are complements. The expected surplus at the optimal effort level is

$$\frac{1}{4}A^2(1+\Delta x)^2 - \rho x. \tag{25}$$

For concreteness sake, we assume

$$\frac{1}{4}[A(1+\Delta)]^2 - \rho > \frac{1}{4}A^2 \quad \text{and} \quad \frac{A(1+\Delta)}{2} < 1. \tag{26}$$

The first condition ensures that under the first best (where effort is observable), it is profitable to use the capital good. The second assumption ensures an interior solution for e.[17] We will therefore refer to $e^* = [A(1+\Delta)/2]^2$ as the first-best level of effort.

If the producer owned the capital, or if there were no moral hazard, that is, a lender could specify a level of effort as a condition of lending to the producer, then effort as above would be efficient and $x = 1$ would be optimal. The analysis is more interesting when we make two key assumptions: (i) effort is unobservable and hence cannot be specified in lending contracts (moral hazard) and (ii) the producer has insufficient wealth to post as a bond in the event that he defaults (limited liability). To capture the latter, we suppose that the producer has an illiquid asset whose value is w. We assume, however, that the assets can be pledged as collateral against borrowing x from the lender. Limited liability implies that he can pay only up to $A(1 + \Delta) + w$, when output is high and w when output is low.

If illiquid wealth were large enough, we would be back to first-best case. It is as if effort could be specified in the contract. By varying the level of collateral demanded, the lender could make the stakes high enough for the borrower so that he puts in the first-best effort level.

It is now clear why property right imperfections will enter the story. Even if the producer has some illiquid wealth that could be pledged as collateral, it is necessary that the legal environment be able to support its use as a bond against not repaying the loan. This is particularly striking in the case where the level of illiquid wealth that the producer owns is large enough to alleviate the moral hazard problem entirely but is prevented from doing so by insecurity of title to that wealth. The illiquid wealth in this case is "dead capital" in do Soto's sense. As we shall see, an economy could then be constrained (in terms of output and efficiency) by the absence of secure title rather than by absence of wealth.

For the purposes of our exposition here, we model this constraint on contracting in a very simple way. Suppose that if a borrower has wealth w, then its collateral value is $(1 - \tau)\, w$, that is, only a fraction of that wealth can be used as effective collateral. This

could be given a stochastic interpretation: with probability $1-\tau$ the lender will be able to foreclose on the asset that was pledged as collateral if output is low and the borrower is unable to repay his loan from the output/revenue of his project.[18] In concrete terms, the parameter τ reflects that in many countries registering assets as property is time consuming and costly.

To understand how property rights matter, we now solve for the optimal debt contract as a function of τ. We will then be explore how changing τ affects optimal debt contracts. A debt contract is an interested payment on a successful project, denoted by r, and a level of collateral, denoted by c, to be paid if the project is unsuccessful. The expected payoff of the producer with a contract (r, c) is:

$$\sqrt{e}\{A(1+\Delta)-r\}-\left(1-\sqrt{e}\right)c-e \tag{27}$$

while that of a lender is:

$$\sqrt{e}r+\left(1-\sqrt{e}\right)c-\rho. \tag{28}$$

The producer always has the option of not borrowing x. This creates an outside option equal to $\frac{1}{4}A^2$. Assumption (26) guarantees that (in principle) there are gains from trade as long as effort can be specified in the contract. A loan transaction takes place so long as the producer's expected payoff is above her outside option and the lender makes nonnegative expected profits. Otherwise, the producer is credit-constrained.

Given r and c the producer chooses her effort to maximize her expected payoff, which yields the first-order condition:

$$\frac{1}{2\sqrt{e}}\{A(1+\Delta)-(r-c)\}=1. \tag{29}$$

Solving this yields an optimal effort level:

$$e=\left[\frac{A(1+\Delta)-(r-c)}{2}\right]^2. \tag{30}$$

This is the incentive compatibility constraint of the borrower. Observe that e and r are negatively related, while e and c are positively related. This is intuitive as r is a tax on success, while c is a penalty for failure.

In addition, the contract also has to satisfy the limited liability constraint:

$$(1-\tau)w\geq c. \tag{31}$$

This says that the payment demanded from the producer when the project is unsuccessful cannot exceed her pledgeable wealth.

Inspecting Eq. (30), it may appear as if it is possible to achieve the first-best effort level by setting $r = c$. However, since c cannot exceed $(1 - \tau)\ w$ this might not be enough for the lender to recover the opportunity cost of capital (ρ). If that is the case, then the lender will need to set $r > \rho > c$. This will imply that effort will fall below the efficient level. This illustrates how agency costs have bite in this world.

We now sketch how the lender will fix the optimal contract when the incentive compatibility and limited liability constraints are binding. Substituting Eqs. (30) and (31) into the lender's payoff function yields the following single variable decision problem to determine the optimal interest payment:

$$\max_r \frac{A(1+\Delta) - (r - w(1-\tau))}{2}(r - w(1-\tau)) + w(1-\tau) - \rho. \tag{32}$$

Solving this yields:

$$r = \frac{A(1+\Delta)}{2} + w(1-\tau). \tag{33}$$

In this case, the lender takes one half the return from a successful project in addition to the value of the pledged collateral. The effort level that the producer puts in is therefore:

$$e = \left[\frac{A(1+\Delta)}{4}\right]^2 \tag{34}$$

which is below the first-best level. Notice that this result does not depend on the security of collateral—τ. The borrower's and the lender's expected payoffs are, respectively: $u \equiv \{A(1+\Delta)/4\}^2 - w(1-\tau)$ and

$$\pi \equiv \frac{1}{2}\left\{\frac{A(1+\Delta)}{2}\right\}^2 + w(1-\tau) - \rho.$$

For trade to take place on these terms, we require that $¼u \geq ¼A^2$. This will happen when

$$w(1-\tau) \leq \frac{A^2}{4}\left[\frac{(1+\Delta)^2}{4} - 1\right] \equiv \underline{\omega}.$$

When the outside option is a binding constraint, then r will be determined by:

$$\left\{\frac{A(1+\Delta)-(r-w(1-\tau))}{2}\right\}^2 - w(1-\tau) = \frac{1}{4}A^2. \tag{35}$$

This yields

$$r = A(1+\Delta) - 2\sqrt{\frac{A^2}{4} + w(1-\tau)} + w(1-\tau), \tag{36}$$

with effort equal to $(A^2/4) + w(1-\tau)$.[19] Now effort is a (decreasing) function of the security of collateral.

We can now define precisely when pledgeable wealth is a constraint on economic efficiency. This will be the case if wealth is insufficient for the first-best effort level to be attainable, that is,

$$\sqrt{\frac{A^2}{4} + w(1-\tau)} \leq \frac{A(1+\Delta)}{2}$$

or

$$w(1-\tau) \leq \frac{A^2}{4}[(1+\Delta)^2 - 1] \equiv \overline{\omega}. \tag{37}$$

If $w(1-\tau) > \overline{\omega}$ then we have a first-best outcome. Evidently, this requires that the availability of illiquid assets (w) has to be large enough. However, this is not sufficient—τ must also be far enough away from one. An economy is constrained by property rights when $w \geq \overline{\omega} > w(1-\tau)$. For $\overline{\omega} > w$ imperfect property rights increase the existing level of inefficiency, while for $w \geq \overline{\omega} > w(1-\tau)$ imperfect property rights create new inefficiencies.

As in previous sections, we turn our focus now to what happens when τ changes marginally. Our simple setup allows us to get a complete understanding of the comparative static of the optimal contract. Our main result drops cleanly out of the analysis.[20]

Result 5. *For $w(1-\tau) \in [\underline{\omega}, \overline{\omega}]$, the interest payment, r, is lower and producer effort is greater after a marginal increase in the security of collateral which increases the level of pledgeable wealth, $w(1-\tau)$. For $w(1-\tau) < \underline{\omega}$, or $w(1-\tau) > \overline{\omega}$, marginal improvements in the security of collateral do not affect resource allocation (i.e., loan size and effort) in the credit market. However, in the former case, it has a redistributive effect with lenders gaining relative to borrowers.*

The result captures the mechanism suggested by de Soto (2000) linking property rights that increase the use of collateral and efficiency. However, it also makes precise

the range of illiquid wealth for which this argument is relevant. If wealth is very low, that is, $w(1-\tau) < \underline{\omega}$, then the outside option constraint is not binding. In this case, the terms of the contract are affected by improvements in property rights, but there is no increase in effort conditional on credit being granted. However, improvement in property rights eases the constraint of transferring resources from the borrower to the lender, and this benefits the lender at the expense of the rent that the borrower gets. Improving property rights have a purely redistributive effect in this case. Similarly, if wealth is very high, the resource allocation is already efficient at the first-best level, and therefore, marginal improvements in property rights will not have any effect.

The upshot of this discussion is that even where there is a "de Soto effect" on effort observed (or, loan size), we would expect that effect to be heterogeneous with $\partial e/\partial\tau$ being proportional to illiquid wealth w. Those with larger levels of illiquid wealth will respond more strongly to a given improvement in property rights. However, beyond the pledgeable wealth of $\overline{\omega}$, the effect again becomes zero.

This illustrates the importance of modeling in seeking to study the impact of property rights improvements on economic outcomes through the collateral channel. Looking for an average effect across a group of producers with heterogeneous wealth could well underestimate the impact which we would expect to find only in the middle wealth group.

There are also implications for looking at the effect of improving property rights in aggregate data. The size of the gains from reducing τ will depend on the distribution of wealth. In particular, in very rich, very poor, or very unequal societies (comprising only very rich or very poor) the overall effect will not be large.

Our model can also highlight another set of effects that have been largely ignored in the empirical and theoretical literature to date. So far our analysis has not considered how changing property rights affects the structure of the credit market and who trades with whom. To illustrate this, suppose that there are many potential lenders who vary in their opportunity costs of capital, ρ, determined by their access to loanable funds.

A simple way to thinking about this is to consider a two-sector model using the labels formal and informal to describe the lenders. In the formal sector, there is a common transactions technology $1-\tau_F$ and access to funds $\rho = \rho_F$. We imagine that producers are also connected to potential lenders through social networks in which case they face property rights enforcement $1-\tau_N$ and lenders with cost of loanable funds ρ_N. The most natural and interesting case to study is where $\tau_F > \tau_N$ and $\rho_F < \rho_N$. This says that formal lenders have better access to loanable funds while the informal sector is better at enforcing contracts. If networks had both lower ρ and lower τ then they would clearly dominate the formal sector.

We will not provide a complete treatment of how people are assigned to the two sectors—that would require a more involved analysis than can be undertaken here. Instead, we will look at some of the issues that arise as property rights change. The

analytical change that is needed to study this is to recognize that the relevant outside option for a producer may no longer be $¼A^2$ but trading with another lender.

Suppose (somewhat unrealistically) that both networks and markets are competitive so that lender rents are bid to zero in each. Then it is straightforward to show that the level of producer utility is:

$$U(\tau_i, \rho_i) = \left[\frac{A(1+\Delta) + \sqrt{[A(1+\Delta)]^2 + 8[w(1-\tau_i) - \rho_i]}}{4}\right]^2 - w(1-\tau_i), \qquad (38)$$

where $i \in \{F, N\}$. We assume $u_i > ¼A^2$ because, otherwise given Eq. (26) no trade will take place. In this competitive world, we would expect the producer to match with the lender for whom this zero profit utility is greatest. Thus, the formal sector will dominate if $U(\tau_F, \rho_F) > U(\tau_N, \rho_N)$. It is clear now that improving formal sector property rights can potentially lead to a move from networks to formal lending as τ_F falls. Since effort is now set by the outside option and is equal to $[(A(1+\Delta) + \sqrt{[A(1+\Delta)]^2 + 8[w(1-\tau_i) - \rho_i]})/4]^2$, moving to a more efficient producer now leads also to greater efficiency. This is a general equilibrium response to an improvement in property rights allowing trade to prosper in its most efficient form. It is related to the effect identified in Section 2.2.1. However, it is now the effect of improved property rights to allow superior trade in another market, the credit market, that drives the result.

There are other possible general equilibrium effects to consider if we move away from the perfect competition story. In the other extreme suppose that there is a single network lender and a single formal sector lender. Each gets to propose a contract to a producer and she picks her preferred outcome. In this case, the reservation outcome is now set by the outside opportunity available either in autarky or else by trading in the other sector. Suppose that the latter is the case. In this case, a producer who chooses to trade in a network will be affected by an improvement in formal sector property rights even if she chooses not to obtain credit in the formal sector. This is because of a pure outside option effect. Improving formal property rights now, through this route, increases effort in the network. However, if trading in the other sector does not provide a good enough outside option (e.g., the borrowers are poor, or the cost difference is large), then an improvement in property rights will benefit the lender and hurt the borrower without having any efficiency effects, as discussed earlier.

Finally, there is the possibility that improving property rights increases competition.[21] To see this, we need to suppose that there are different possible levels of ρ_F with some formal sector firms being more efficient. Suppose, for example, there is no informal sector, but two formal sector lenders with different levels of ρ_F but the same level

of τ_F. Suppose that the cost difference between the two lenders and the level of τ_F are such that the higher cost formal sector lender cannot provide any competition to the lower cost lender, and autarchy is the only outside option of a borrower. A further effect of improving τ_F can now be to induce entry in the formal sector increasing the outside option of the producer. This leads to a redistribution of surplus from the efficient formal sector producer to the producer. But it also increases efficiency by increasing the outside option of the producer. This will increase producer effort.

The latter effects that we have identified come from thinking about how the improvement of property rights affects the set of potential trades that can be sustained between lenders and producers. One feature of formal sector enforcement is that it is a freely available contracting technology, whereas the τ_N is available only for trades between people who know each other. When considering property rights that improve trading possibilities the benefits from the creation of formal property rights may in significant measure be due to the fact that these are widely available, that is, to all producers rather than just those who are socially connected. This highlights a potential downside in the use of networks in enforcing trade.

2.3 Optimal assignment of property rights

So far we have discussed how insecure property rights impede efficiency by undermining investment incentives, and creating barriers to trade. Consequently, our analysis has focused on the channels through which making property rights more secure for the producer will improve efficiency. This implicitly assumes that the initial assignment of property rights to the producer is optimal.

In this section, we question this and discuss the role of property rights in assigning ownership to an asset to maximize its productive potential. We have already looked at one aspect of this issue in Section 2.2.1 where we allowed for the possibility that the current owner may not be the most efficiency potential user of an asset. The aspect that we address here allow for the possibility that more than one party can invest to improve the productivity of an asset. Our discussion of these issues is based on the literature on the property rights approach to the theory of the firm developed in Grossman and Hart (1986) and Hart and Moore (1990).

2.3.1 Optimal ownership of an asset

We extend our benchmark model above by considering two individuals, A and B, who undertake investments e_A and e_B that, in combination with the asset, generate returns $a\sqrt{e_A} + b\sqrt{e_B}$. The costs of these investments to A and B are, respectively, e_A and e_B. The terminology "investment" here as opposed to "effort" in the last section emphasizes the durability of the activity. We have in mind that the effort undertaken by each party creates something which is potentially of value to the future output from the asset even if the party who makes the decision is separated from the asset.

The first-best levels of these investments are:

$$e_A^* = \frac{a^2}{4} \quad \text{and} \quad e_B^* = \frac{b^2}{4}. \tag{39}$$

The associated total surplus is:

$$S^* = \frac{1}{4}(a^2 + b^2). \tag{40}$$

Without any contracting problems, ownership does not have allocative implications, that is, a contract can be written in which investment levels $\{e_A^*, e_B^*\}$ are prescribed.

The key insight of the property rights approach is that ownership matters due to contractual incompleteness. In this example, the owner has some bargaining power as he can threaten to exclude the other party from using the asset (i.e., he can "fire" the other party and exclude him from the returns from his investment). Ownership is now different from residual claimancy of a profit stream: it is the residual control right over the asset.

If the owner of an asset rents it out to someone, the tenant has residual claimancy. However, the owner retains the right not to renew the lease. This will potentially affect the incentive of the tenant to improve the asset. It is these residual control rights that give the owner a bargaining advantage over the nonowner.

As we shall see, this improves investment incentives for the owner while worsening them for the tenant. The optimal assignment of ownership takes into account how important is the investment decisions of each party and how severe is the holdup problem from having each party not owning the asset. The term holdup here refers to the fact that the owner can limit the value of an investor's input to the project by firing him *ex post*.

To illustrate these arguments more precisely, assume that e_A and e_B are observable but nonverifiable. The last of these assumptions implies that a court could not enforce stipulated effort levels as it would be impossible to verify whether they were implemented. Thus investment levels are noncontractible *ex ante*. The two parties are assumed to bargain over the *ex post* surplus once it has been created.

Suppose first that party A is owner. Then at the bargaining stage, he has the right to fire B. Let $\overline{u}_i^j$ denote the disagreement payoff or outside option of i when j is the owner. We assume that even if A fires B at the bargaining stage, he can still make some use of the results of B's investments. Specifically, a fraction λ of the investment remains to be exploited by A in B's absence. It is useful to think of λ as measuring the extent of asset specificity. In the model of the previous section where e_B would be generic "effort" then $\lambda = 1$. However, where there is something special about B's human

capital which requires his continued involvement in the project to make the most of it, then $\lambda < 1$.

Putting this together, the outside options of the two parties are $\overline{u}_{\mathrm{A}}^{\mathrm{A}} = a\sqrt{e_{\mathrm{A}}} + \lambda b\sqrt{e_{\mathrm{B}}}$ and $\overline{u}_{\mathrm{B}}^{\mathrm{A}} = \overline{u}_{\mathrm{B}}$ where $\overline{u}_{\mathrm{B}}$ is the exogenously given level of the disagreement payoff of B. Using the symmetric Nash bargaining formula,[22] the *ex post* payoff of A is:

$$\frac{1}{2}\left(a\sqrt{e_{\mathrm{A}}} + b\sqrt{e_{\mathrm{B}}}\right) + \frac{1}{2}\left(\overline{u}_{\mathrm{A}}^{\mathrm{A}} - \overline{u}_{\mathrm{B}}^{\mathrm{A}}\right), \tag{41}$$

which simplifies to

$$a\sqrt{e_{\mathrm{A}}} + \frac{1}{2}(1+\lambda)b\sqrt{e_{\mathrm{B}}} - \frac{\overline{u}_{\mathrm{B}}}{2}.$$

Similarly, the *ex post* payoff of B is

$$\frac{1}{2}\left(a\sqrt{e_{\mathrm{A}}} + b\sqrt{e_{\mathrm{B}}}\right) + \frac{1}{2}\left(\overline{u}_{\mathrm{B}}^{\mathrm{A}} - \overline{u}_{\mathrm{A}}^{\mathrm{A}}\right), \tag{42}$$

which in turn simplifies to

$$\frac{1}{2}(1-\lambda)b\sqrt{e_{\mathrm{B}}} + \frac{\overline{u}_{\mathrm{B}}}{2}.$$

The two parties will choose e_{A} and e_{B} at the *ex ante* stage anticipating the *ex post* payoffs derived above. As a result the optimal choice of these variables are

$$\hat{e}_{\mathrm{A}}^{\mathrm{A}} = \frac{a^2}{4} \quad \text{and} \quad \hat{e}_{\mathrm{B}}^{\mathrm{B}} = \frac{b^2(1-\lambda)^2}{16}. \tag{43}$$

This yields a second-best net expected surplus of

$$\hat{S}^{\mathrm{A}} = \frac{a^2}{4} + \frac{b^2}{16}(1-\lambda)(3+\lambda). \tag{44}$$

This is less than the first-best surplus S^*.[23] Since B anticipates that, after the investments are made, he will be at the mercy of A, he invests less than the first-best level. The higher is λ, the less costly it is for A to fire B and the greater is the incentive problem of B. However, if $\lambda = 1$, there is full exploitation of B's output and he does not invest at all. If we think of λ as representing the extent of specialized skills, then economies

with greater skill intensity will suffer a smaller efficiency loss through this effect than those which only have generic labor input.

There are symmetric expressions if B is the owner. We now use $\mu \in [0, 1]$ to be the investment specificity parameter analogous to λ. By a similar analysis we find:

$$\hat{e}_{\mathrm{A}}^{\mathrm{B}} = \frac{a^2}{16}(1-\mu^2) \quad \text{and} \quad \hat{e}_{\mathrm{B}}^{\mathrm{B}} = \frac{b^2}{4}. \tag{45}$$

Second-best surplus (also less than S^*) is:

$$\hat{S}^{\mathrm{B}} = \frac{a^2}{16}(1-\mu)(3+\mu) + \frac{b^2}{4}. \tag{46}$$

As before, a larger value of induces a greater efficiency loss, all else equal.

We can now which party should own the asset to maximize economic efficiency (measured by total surplus) as a function of the key parameters: a, b, λ, and . Comparing Eqs. (44) and (46), we find that A should owner the asset if $a^2(1+\mu)^2 > b^2(1+\lambda)^2$, while B should own it otherwise. We state this finding as:

Result 6. *If the marginal return of A's (B's) investment is greater than that of B's (A's) or his investment is more asset-specific than B's (A's), under the efficient assignment of property rights A (B) should own the asset.*

This theory of the "optimal" allocation of property rights can be thought of as reflecting two dimensions of the skill of the investors. The parameters a and b reflect their relative productivities as investors with a presumption that the most productive should own the asset. But the specificity of their skills matters too. If one investor has a very specialized skill so that replacing him would lead to a major loss in output, then it is best that he owns the asset. If not, the investment process is more prone to hold up. So if one party supplies generic effort which stays with the project whether or not he leaves, he will generally not optimally be the owner.

These ideas apply to thinking about ownership structures in agriculture in developing countries where landlords and tenants both have skills that can play a role in improving the land. The land should optimally be sold off to the tenant if the latter is more productive and has more land specific skills than the landlord. We now consider tenancy issues in more detail in light of this insight.

2.3.2 Role of tenancy

The model in the last section predicts that tenancy is an efficient arrangement when the landlord has high productivity and a high level of asset specificity. But in many contexts, the first of does not seem prima facie reasonable. The persistence of tenancy would then seem more plausibly due to the fact that credit market imperfections

prevent the transfer of the land to the tenant. There could also be other benefits to holding land such as linked benefits in the form of patronage or political power which make the land more valuable to the landlord and mean that he would always outbid the tenant for the land in an auction.

To explore this, we will suppose that A is the landlord, but $a = 0$ so that B should optimally be the owner. The value of the asset when A is the owner is $\hat{S}^{\mathrm{A}} = (b^2/16)(1-\lambda)(3+\lambda)$ and since B's outside option is $\overline{u}_{\mathrm{B}}$, A's payoff is $\hat{S}^{\mathrm{A}} - \overline{u}_{\mathrm{B}}$ and B's payoff is $\overline{u}_{\mathrm{B}}$. If B is the owner, the value of the asset is $\hat{S}^{\mathrm{B}} = b^2/4$. If B had the ability to make up-front payments, there are gains from trade. For example, if the transfer price p is set at $\hat{S}^{\mathrm{B}} - \hat{S}^{\mathrm{A}}$ then A is strictly better off and B is no worse off when ownership is transferred to B. But if B has no liquid funds, then this transfer will not take place. The arrangement that prevails will then resemble a share tenancy where B gets a 50% share of output.

It might be possible for a third-party (a bank) to enable B to buy the asset. To keep things simple, suppose that the interest rate is normalized to zero and B will simply have to pay back p to the lender. The problem now is that B will be in the same situation *vis-a-vis* the bank as he was previously *vis-a-vis* the landlord. So there is no gain in transferring ownership to a different unproductive party.

A land reform that transferred ownership to party B would now raise productivity. In fact, this is true for any land reform that dilutes the landlord's rights. To see this, suppose that with probability $\tau \in [0, 1]$ the tenant (party B) will acquire the land. This is similar to the way that we modeled attenuated property rights in Section 2.2.1. Now with probability $(1-\tau)$, B's *ex post* payoff is as before, that is, $\frac{1}{2}(1-\lambda)b\sqrt{e_{\mathrm{B}}} + \frac{1}{2}\overline{u}_{\mathrm{B}}$ but with probability τ it is $b\sqrt{e_{\mathrm{B}}}$ as A has been expropriated via the land reform. Now

$$\hat{e}_{\mathrm{B}}^{\mathrm{A}} = \left\{\frac{1}{2}(1-\tau)(1-\lambda) + \tau\right\}\frac{b^2}{4}. \tag{47}$$

When $\tau = 1$ this coincides with the outcome under pure B-ownership and when $\tau = 0$ it coincides with the outcome under A-ownership. Party B's investment is increasing in τ. We now have:

Result 7. *In the presence of frictions that prevent the efficient allocation of property rights, transferring property rights to the tenant will increase efficiency. Greater security of property rights for the initial owner now reduces efficiency.*

This result underpins the classic argument for forcible land redistribution toward tenants. That insecure property rights of one party (here the landlord) may enhance productivity is an application of the theory of the second best. Given that ownership is inefficient due to imperfect capital markets, a second distortion (imperfectly enforced property rights) can be efficiency enhancing. This result relates to the large literature on

tenancy showing that redistributive reforms such as land reform or tenancy reform might improve productivity and that the standard efficiency-equity trade off need not apply in all cases.[24]

There is a link between this analysis of optimal property rights and the discussion of insecure property rights in the previous section. The producer in the benchmark model above could be thought of as the "rightful" owner (from the efficiency point of view) and the insecurity in the form of τ as therefore arising out of an inefficient allocation of property rights. Since the coercive authority cannot commit not to expropriate the producer, there is an *ex post* holdup problem and as a result of this the producer only gets a fraction of the share of the results of his investment. It is therefore inefficient if the coercive authority ends up owning the land. In Section 3 we will examine this issue in greater detail.[25]

2.3.3 Communal property rights

The model developed so far looks solely at individualistic property rights. But it is often argued that communal property rights can, under some circumstances, be superior (see, e.g., Platteau, 2000). One way to think about communal property rights is that they maximize joint surplus because consumption is shared among members of the community. In that case, by assumption, communal tenure will always achieve the first best. This is not entirely plausible since the evidence of communal property rights does not provide unambiguous support to this view. For example, the well documented increases in agricultural productivity in China after switching to a household responsibility system seems to go against this finding.[26] A more promising approach would be to examine under what circumstances communal property might achieve greater efficiency than individual property rights.

In the above framework, communal property rights are best thought of as joint ownership in the sense that, if there is a disagreement at the bargaining stage, then production cannot go ahead. In other words, both parties have veto power (this is how joint ownership is modeled in Hart, 1995), that is, the disagreement payoffs of both parties are zero. In this case, it would seem likely that the holdup problem would be worse than with either party owning the land individually.

To examine this formally, observe that, using the symmetric Nash bargaining formula, the *ex post* payoff of both A and B is now

$$\frac{1}{2}(a\sqrt{e_{\mathrm{A}}} + b\sqrt{e_{\mathrm{B}}}). \tag{48}$$

Then the investment levels are $\hat{e}_{\mathrm{A}}^{\mathrm{J}} = a^2/16$ and $\hat{e}_{\mathrm{B}}^{\mathrm{J}} = b^2/16$, and the second-best net expected surplus is

$$\hat{S}^{\mathrm{J}} = \frac{3a^2}{16} + \frac{3b^2}{16}. \tag{49}$$

It is straightforward to see that this level of surplus is less than both $\hat{S}^{A}$ and $\hat{S}^{B}$. In other words, joint ownership is dominated by individual ownership.[27] As conjectured, joint ownership exacerbates the holdup problem.

But this negative conclusion on the merits of communal property rights depends on the output being a purely *private* good. To see this, suppose instead that the good produced is public so that, even if one of the parties is excluded by the owner, he is still able to enjoy some of the benefits. This might be, for example, because there are features of the asset that are enjoyed in common. More generally, any investments that improve the quality of an asset might spillover in part to neighbors.

The following extension of the model to public goods is based on Besley and Ghatak (2001) which extends the property-rights approach to the case of pure public goods. They show that joint ownership may dominate private ownership in this case.

To illustrate the argument, consider the following simplified version of the above model. Suppose that $a = 0$ implying that, if this was a private good, then B should be the owner. Suppose that the output $b\sqrt{e_B}$ is now a pure public good and θ_A and θ_B are the valuations of that good of parties A and B. The joint-surplus maximizing level of investment is now given by:

$$e_B^* = \arg\max_{e_B} \left\{(\theta_A + \theta_B) b\sqrt{e_B} - e_B\right\} = \frac{b^2(\theta_A + \theta_B)^2}{4}. \tag{50}$$

A key distinction from the private good case is as follows. Since the output is a pure public good, then even if bargaining breaks down, the owner cannot exclude the other party from enjoying the benefit of it. Therefore, under B ownership $\overline{u}_A^B = \theta_A b\sqrt{e_B}$ and $\overline{u}_B^B = \theta_B b\sqrt{e_B}$.[28]

As a consequence, the choice of investment is given by $\hat{e}_B^B = b^2\theta_B^2/4$. Under A-ownership $\overline{u}_A^B = \theta_A \lambda b\sqrt{e_B}$ and $\overline{u}_B^B = \theta_B \lambda b\sqrt{e_B}$. Hence, the choice of investment is given by

$$\hat{e}_B^A = \frac{b^2}{4}\left\{\theta_B \frac{(1+\lambda)}{2} + \theta_A \frac{(1-\lambda)}{2}\right\}^2.$$

In contrast, under joint ownership $\overline{u}_A^J = \overline{u}_B^J = 0$ and the choice of investment is given by

$$\hat{e}_B^J = \frac{b^2}{4}\left(\frac{\theta_B + \theta_A}{2}\right)^2.$$

If $\theta_A > \theta_B$ then both ownership by A and joint ownership dominates ownership by B. This contrasts with the case of a purely private good. Moreover, if $\lambda > 0$, joint ownership dominates ownership by A.

We summarize this result as:

Result 8. *When the output produced with the asset is a public good, then communal property rights (joint ownership) may sometimes be optimal.*

The intuition behind this result is simple. Joint ownership "ties down" the two parties to the project and hence minimizes free-riding which is a problem for the provision of public goods.

Property rights allocation in the case of partly private and partly public goods has not been investigated much in the literature. However, it does seem relevant for understanding some forms of organization, especially in the context of communal assets such as condominium housing arrangements. This analysis suggests that, in general, the greater is the public good component in production, the more likely joint ownership will dominate individual ownership.

2.4 Evidence

This theoretical analysis naturally gives way to thinking about how property rights affect resource allocation in practice. There is now a significant literature which looks at this.[29] However, it is fairly rare to link the empirical analysis closely to the theoretical channels that we have analyzed so far.

One issue is what outcome to focus on. In a reduced form sense, all of the theoretical channels identified above would suggest a link between the level of output and property rights. In all cases, the level of investments, in the stylized model e, is (weakly) higher when property rights are more secure. However, as we showed in the example of guard labor, there can also be a reallocation of effort to or from more productive activities.

The two trade channels are quite specific in the way that they suggest that improved property rights will have an impact. In the first case, we should see a deepening in rental or sale markets for assets. In the second, we should see more use of credit among those whose property rights to collateralizable assets are improved. To investigate these ideas empirically requires going beyond looking solely at the effects on output, although we would expect output to be higher in both cases too.

One further issue concerns the level of aggregation. Our theoretical examples focused on a specific producer with fixed characteristics. These models mostly predict that the effect of improved property rights will be heterogeneous. To illustrate, consider the basic freedom from expropriation argument. In this case:

$$\frac{\partial e^*}{\partial \tau} = -\frac{(1-\tau)A^2}{2}. \tag{51}$$

This implies that factors that make A heterogeneous across producers such as wealth, access to other inputs and/or markets will tend to affect the marginal effect of an improvement in property rights. Such heterogeneous effects are a natural consequence of bringing theoretical considerations to bear on the analysis of the data.

We might also expect macroeconomic and microeconomic impact effects to be different in so far as the former capture general equilibrium responses to improvements in property rights. The overall macroeffect can mask many underlying mechanisms as emphasized here.

Another issue in bringing these ideas to the data concerns how to capture property rights. Our simple theoretical parameter, τ, masks a whole range of possibilities. In microdata, it is frequently possible to be quite precise about the claims that people have to their assets. For example, some asset ownership is backed by officially recognized and registered title deeds. However, other property is held more informally. A good example is the case of land rights in Ghana where land rights are granted by tribal authorities. Moreover, the rights to each plot of land are quite heterogeneous. In the data used in Besley (1995), rights can be decomposed into the different components—buying, selling, renting, leasing, and pledging.

The key issue whether in micro- or macrodata is how to identify the causal effect of changes in property rights on investment or productivity. Macroevidence tends to look at countries as units of analysis, sometimes regions within countries. Microevidence looks at the effect of property rights using data on firms and/or households. The core empirical approach is to run some kind of regression of the form:

$$y_{it} = \alpha + \beta r_{it} + \gamma x_{it} + \varepsilon_{it}, \tag{52}$$

where y_{it} is a measure of an outcome for cross-sectional unit i at date t, r_{it} is a measure of property rights and x_{it} are appropriate controls and ε_{it} is an error term.
In the basic case, there is no time dimension to this kind of analysis and the effect of property rights on outcomes is driven entirely by the fact that some firms or households appear to have better access to rights than others at a point in time. This raises quite difficult issues in estimating β. Omitted variables could be driving a simple correlation between the two: for example, better governance could be driving both secure property rights and a more investment-friendly environment. The other issue is that of reverse causality: investment itself could affect the nature of property rights.

In principle, either of these problems could be dealt with using instrumental variables, that is, finding a determinant of r_{it} which is not also a determinant of the decision of interest x_{it}. This is the approach of Acemoglu, Johnson, and Robinson (2001) in their study of cross-sectional country differences in property rights. They argue that settler mortality drives expropriation risk without having any direct impact on modern

day income *per capita*. In general, however, it is difficult to find convincing instruments even in microdata.

In some cases, there are changes in rights over time and space which allow researchers to explore the implications of changes in rights before and after with an explicit time dimension. Whether this succeeds in dealing with the issues of omitted variables and reverse causation is moot. This still depends on how the rights are allocated to households or firms. There may be scope for finding ways of explicitly modeling the political and economic forces that shape r_{it}.

Another route is to exploit variation between rights "within" firms or households. Thus, Besley (1995) exploits the fact that households in Ghana enjoy different rights on different plots of land that they farm and is able to look at how economic decisions vary across plots. This means that variation in household characteristics that affect the power of households to enhance their rights is not spuriously driving the relationship between economic outcomes and property rights.

Either way, this brief discussion emphasizes the need to understand the reasons why property rights differ in different times and places. This is something that we turn to in Section 3.

It is possible to take a bird's eye view of the quality of property rights using cross-country data. To illustrate, we take two measures of property rights regimes using standard sources. The first is a measure of the security of property rights from the International Country Risk Guide (ICRG). It is measured on a scale between 0 and 10. A higher score corresponds to better protection of property rights. Figure 1 shows that this score is positively correlated with income *per capita* in the year 2000. In other words, countries with a higher risk of expropriation have lower levels of income *per capita*.

The second measure comes from the World Bank doing business project (http://www.doingbusiness.org). We focus on a measure of the ease with which individuals can register their property, specifically the country's rank on this measure for 172 countries. This is a purely administrative dimension to property rights and follows the logic of the de Soto argument discussed in Section 2.2.2. Figure 2 shows that this too is strongly negatively correlated with income *per capita* in 2000. Thus, this more administrative dimension of property rights is weaker in low-income countries.

Together these figures illustrate the central proposition that improving property rights is associated with economic development. However, they say nothing about the direction of causation.

The correlation in Figure 1 is intriguing and forms the basis of the well-known empirical analysis of Acemoglu, Johnson, and Robinson (2001) who argue that this relationship is indeed causal. To this end, they use the mortality rates of colonial settlers as an instrument for property rights showing that the negative relationship between the ICRG expropriation risk measure and income *per capita* remains. Acemoglu and

Figure 1 Expropriation risk and income *per capita*.

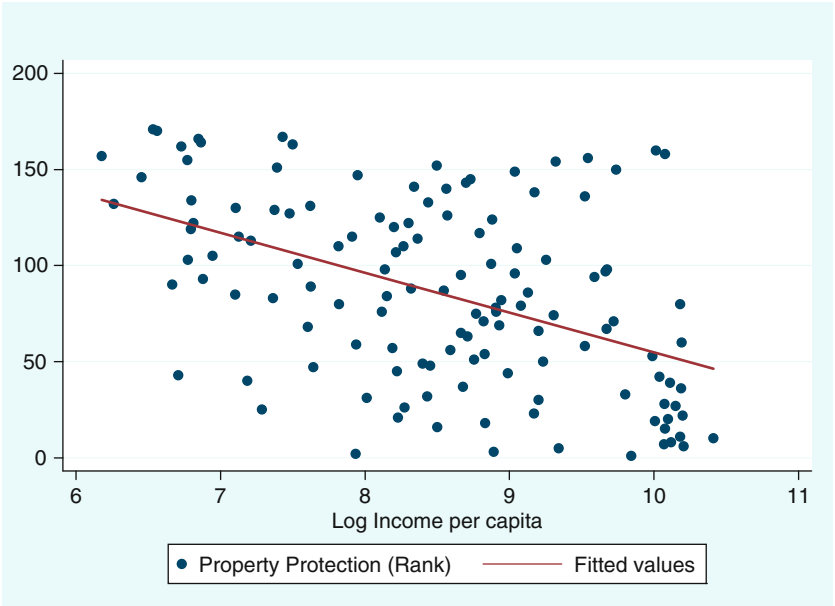

Figure 2 Property registration and income *per capita*.

Johnson (2005) look at two different dimensions of property rights and how they affect growth—expropriation risk and contract enforcement. Their aim is to assess which is more important in affecting aggregate output. They use the identity of the colonial power as an instrument for contracting institutions and settler mortality as the instrument for expropriation risk. On this base, they argue that only expropriation risk holds up as causal factor in affecting income *per capita* while the contracting environment affects the form of financial intermediation. In a related contribution, Glaeser, La Porta, Lopez-de-Silanes, and Shleifer (2004) argue that human capital could be a key missing variable in this kind of analysis, jointly determining both institutions and growth. However, given the scarcity of plausible instruments, it is clearly difficult to be able to identify between many competing potential causal pathways in cross-country data.

There are several microempirical studies that look directly at the question of whether secure property rights improve investment incentives. Here we provide a brief and selective review of the key findings. Besley (1995) in his study of property rights in Ghana, mentioned above, exploit the variation in the rights that individuals enjoy on different fields to test whether property rights matter for investment decisions. Ghana is in a transition between a traditional system of land rights (which emphasizes claims of the community) and a modern one (which emphasizes the claims of the individual and grants ability to transfer the land without needing a community sanction). The study focuses on self-reported transfer rights: whether each field owned and operated by a household has any of these rights is measured in the data, along with whether exercising this right requires lineage approval. In his study of the cocoa growing region, Wassa, in the west of the country, where the investment decision is the decision to plant trees, he finds that controlling for household fixed effects, investment is increased by better land rights. The study takes into account the potential problem of reverse causality: investment decisions (e.g., planting trees) could affect security of tenure as well. The basic result holds if land rights are instrumented with field level characteristics (soil quality, distance from house, investments already made when land acquired). As to which mechanisms linking property rights to investment are at work, this study is unable to find strong support for any particular mechanism, but on the whole, the support is the weakest for the collateral-based view.

In a more recent study on Ghana, Goldstein and Udry (2008) exploit the variation in security of tenure within the system of informal property rights administered by the local political system. They find that those cultivators without political power (e.g., those who do not hold any form of local political office) are less confident of their rights. Compared to those who hold political office, they leave their land fallow for significantly shorter duration (for fear that the land will be allocated to someone else), resulting in significant loss in profits per unit of land.

In a related study Field (2007) finds that property titles issued in Peru starting in the mid-nineties led to a significant increase in labor supply by urban slum dwellers. The

study looks at the effect of the program undertaken by Peruvian government that issued property titles to 1.2 million urban households during the 1990s on labor supply. While it does not directly look at the effect of investment, a key mechanism postulated in the chapter is that secure property rights reduced the need for guard labor and this freed up labor time that could be efficiently supplied in the labor market. In a related paper Field (2005) looks directly at investment and shows that residential investment also went up significantly, using a similar identification strategy and retrospective data on housing construction.

A more recent study (Hornbeck, 2008) shows that the introduction of barbed wire fencing to the American Plains in the late nineteenth century led to significant increases in the value of farmland, the productivity and production share of crops most in need of protection. Farmers were required to build fences to secure their land. From 1880 to 1900, the introduction and universal adoption of barbed wire reduced the cost of fencing, relative to wooden fences, most in counties with the least woodland. Over that period, counties with the least woodland experienced significant agricultural development and according to this study, this appears to reflect increased security of property rights due to barbed wire fencing.

Galiani and Schargrodsky's study (2005) is one of several studies that look at the collateral effect of property rights reform. It focuses on urban squatters in Argentina. Given that the allocation of titles was unlikely to have been random, they exploit a data-set which permits a cleaner identification strategy. They look at a group of squatters who occupied an area of wasteland in the outskirts of Buenos Aires more than 20 years ago from the time of the study. The area was composed of different tracts of land, each with a different legal owner. An expropriation law was subsequently passed, ordering the transfer of the land from the original owners to the state in exchange for a monetary compensation, with the purpose of entitling it to the squatters. However, only some of the original legal owners surrendered the land. The parcels located on the ceded tracts were transferred to the squatters with legal titles that secured the property of the parcels. Other original owners, instead, are still disputing the government compensation. As a result, a group of squatters obtained formal land rights, while others are currently living in the occupied parcels without paying rent, but without legal titles. Both groups share the same household pretreatment characteristics. Moreover, they live next to each other, and the parcels they inhabit are identical. Since the decision of the original owners of accepting or disputing the expropriation payment was orthogonal to the squatter characteristics, the allocation of property rights is exogenous in equations describing the behavior of the occupants. This assumes that this decision is orthogonal to land quality which seems reasonable in their context.[30]

They find significant effects on housing investment, household size, and child education. The quality of the houses is substantially higher in the titled parcels. They only find modest effects on access to credit markets as a result of entitlement, and no

improvement in labor market performance. This is not surprising, as squatters could not transfer the property parcels for the first 10 years. They do compare early and late treatment households and find that 4% of the early treatment group received a mortgage loan. Their conjecture is that this small effect could be driven by difficulty of foreclosure on default.

Another study by Field and Torero (2006) looks at an urban land titling program in Peru. Their data allow them to directly observe whether loan applicants are requested to provide collateral. As a result they can isolate the effect of property titles on credit supply from their effect on demand by comparing loan approval rates when titles are requested to rates when they are not. Their results indicate that property titles are associated with increase in approval rates on public sector loans by as much as 12% when titles are requested by lenders. But they find no relationship between titles and approval decisions otherwise. In contrast, there is no evidence that titles increase the likelihood of receiving credit from private sector banks, although interest rates are significantly lower for titled applicants regardless of whether collateral was requested.

One explanation for this failure is that titling programs reduce banks' perceptions of their ability to foreclose. This is supported by data from Peru indicating that individuals with title have less fear of losing property in cases of default. Also, in Peru (and other comparable developing countries) even the middle-level propertied classes do not find it easy to receive credit. For example, in Peru a minimum of 2 years of tenure in a formal sector job and a high wage is a prerequisite for receiving loans from the formal sector. Therefore, it is not surprising that the urban squatters did not experience a huge increase in credit supply.

Another possibility is that de Soto essentially assumes that the binding constraint is always finance (which one can obtain by pledging collateral). But if a producer is in a low-return environment, because of either other shortcomings in the institutional environment or market failures, collateral is not going to do much good.[31]

However, more encouraging evidence is provided by Wang (2008) who looks at a housing reform in China that allowed state employees who were renting state-owned housing to buy their homes at subsidized prices. She finds that the reform increased the ability of individuals to finance entrepreneurial ventures by allowing them to capitalize on the value of the property.

The implications of weak property rights have been studied using microdata on firms. An interesting study along these lines is Johnson, McMillan, and Woodruff (2002) which uses a survey of firms in postcommunist countries. Their data exploit variation across firms and from different country institutional environments. They find that weak property rights do discourage firms from reinvesting their profits, even when bank loans are available. Where property rights are relatively strong, firms reinvest their profits. However, weak property rights appear to deter entrepreneurs from investing from their retained earnings.

3. ENDOGENOUS PROPERTY RIGHTS

So why might property rights protection be weak? While historically, nonstate actors have played a key role in the creation and enforcement of rights, in the modern world weak property rights boil down to problems in the way that the state functions. There are three types of state failure that are relevant to understanding this: predatory states, anarchic states, and ineffective states.

Predatory states are strong states that cannot find ways of limiting their own power. Anarchic states are those where there is no single authority—as when war lords and mafiosi retain coercive power.[32] The power to enforce or violate property rights is therefore fragmented.

Ineffective states are those which, although they may have established a monopoly of force within a certain domain, have not invested sufficiently in relevant market supporting public goods such as courts and property registries. The first problem (predation) is an issue when the state is strong while the latter two (anarchy and ineffectiveness) are characteristic of weak states.

To date, most of the existing literature has focused on the first two problems. For example, Djankov, Glaeser, La Porta, Lopez-de-Silanes, and Shleifer (2003) pose the dilemma of effective government as finding the right balance between the problem of predation due to excessive state authority and anarchy due to weak state institutions. We will argue in Section 3.2 that understanding the forces that shape incentives to invest in market supporting property rights is also important.

3.1 Expropriation

There has been much discussion of aspects of state expropriation and arguments to the effect that limiting coercive power of the state is an important historical feature of state and market development (see, e.g., North, 1990). A classic reference is North and Weingast (1989) who argued that a decisive point in the history of state development in England came after the Glorious Revolution which limited the arbitrary power of the King subordinating his ability to raise taxes to Parliament. The need to limit state power and hence protect property rights is also at the heart of Acemoglu, Johnson, and Robinson's interpretation (2001) of why states with low rates of settler mortality built more effective states with more respect for private property.

Models of states' incentives to exploit arbitrary power include Grossman and Kim (1995), Grossman and Noh (1994), Moselle and Polak (2001), and Olson (1993).[33] It might be tempting to conclude that the problem of excessive state power is only a feature only of models where the government is controlled by a self-interested ruler intent on extracting resources from its citizens. However, as Kydland and Prescott (1977) shows, it may be optimal to limit state power even when the government is benevolent if it cannot commit to a future policy.

Expropriations by government are a fact of historical experience as illustrated in Table 1 which gives some examples over 700 years of human history. It begins with the expropriation of the Knights Templar by Philip IV of France in 1307. Thereafter, we find other regular examples of sovereign power being used to seize assets. Henry VIII dissolved the monasteries in England and took over the land beginning in 1536. The US government now widely regarded as paragon for upholding property rights

Table 1 Expropriations in selected countries

France, 1307-1312	From 1307 onward, Philip IV of France seized assets of the Knight Templars to alleviate France's serious financial problems. Five years later, Pope Clement V, pressured by the French King, abolished the order and transferred part of their assets to the Hospitallers. The value of the seized assets were likely significant as the Knights Templars operated the first known international banking network using their military strongholds
England, 1536-1541	Between 1536 and 1541 King Henry VIII expropriated monasteries in England and took over their land, amounting by some estimates to over 30% of the land holdings in England at that time. Some of the land and buildings went into the ownership of the crown, others were sold to the gentry. One of the unwanted side effects of the expropriation was the creation of a powerful upper class in England which became a serious restriction on the King's policies thereafter
United States, 1870-1910	Expropriation was commonly used as an instrument of public policy, designed to subsidize private enterprises in Railway construction, Milling and Mining. Expropriations and legislation supporting them were common in the United States at that time. Colorado's constitutional convention of 1875-1876, for example, stated that private property might be taken for "private ways of necessity, . . . reservoirs, drains, flumes, or ditches on or across lands of others, for mining, milling, domestic, or sanitary purposes"
Mexico, 1936-1938	As part of President Cardenas six year plan, the Mexican government expropriated direct investments in Agriculture, Railway and particularly Petroleum. Estimates of the Brookings institution put the value of expropriated properties belonging to US citizens to

Table 1 Expropriations in selected countries—Cont'd

	over $ 300 million. The reaction was an Anglo-American boycott, decreasing oil exports and eventually a devaluation of the peso. Foreign direct investment contracted by more than two thirds between 1935 and 1940
Iran, 1951	British oil production facilities in Iran were expropriated under Prime Minister Mohammad Massadeq. In response, Britain boycotted Iranian oil depriving the country from its largest market. Supported by the United States and England, pro-monarchy forces toppled the government in 1953
Egypt, 1956	Following a withdrawal of American and British finance for the Aswan Dam, President Nasser nationalized the Suez Canal in 1956. The nationalization was the trigger to an armed conflict in the region including Isreal, France, and Britain and the occupation of Egypt
Cuba, 1959-1960	Following the Cuban Revolution in 1958, the Cuban government seized properties belonging to US nationals with an estimated value of $1.8 billion. This was a higher amount than the total amount expropriated by all other Communist countries combined. The sectors most affected were public services, sugar growing and milling, and oil refining. The US government sanctions Cuba from the 1960s onward. Disruption in trade was enormous as trade links with the United States were close. The World Bank estimates that real GDP *per capita* was steadily decreasing for at least a decade after the expropriation
Algeria, 1971-1980	In 1971, President Boumediene inaugurated the "agrarian revolution"—a large-scale land reform which aimed at partial redistribution and nationalization of large land holdings. Absentee landowners were to be entirely expropriated. While a significant share of landowners avoided redistribution, over 1.3 million hectares had been distributed to nearly 100,000 beneficiaries by 1980. In the period following the reforms, productivity dropped drastically and agrarian production suffered. Partial reversal of reforms in the 1980s could not prevent heavy dependence on imports and rising food prices followed by social unrest

Continued

Table 1 Expropriations in selected countries—Cont'd

Chile, 1971	Led by President Allende, the Chilean government expropriated US copper mining companies of assets worth more than $500 million. Expropriations were carried out through a constitutional amendment approved by the Chilean Congress in 1971. The case triggered conflict with the US companies and government and was followed by withdrawal of credit
Zimbabwe, 2000-2001	When the political mood seemed to swing against him in February 2000, Zimbabwe's president Mugabe launched a program of land redistribution. The relatively chaotic program was spearheaded by his party's paramilitary wing who began occupying white owned farms around the country. The land was taken, divided, and sold or given to peasants and party supporters. In the years following the expropriation, Zimbabwe's economy featured negative growth and rising levels of inflation. The country has increasingly become dependant on food aid

Sources: Baklanoff (1975), Barber (1994), Martin (2004), Rajan and Zingales (2003), Searingen (1990), Scheiber (1973), and World Development Indicators.

used expropriation as an instrument of public policy from 1870 onward to promote railway construction, milling, and mining.

Natural resources have also figured in government expropriations of the past. President Cardenas of Mexico expropriated, among other things, petroleum assets in the 1930s. Iran expropriated oil production facilities in 1951. The Cuban revolution in 1959–1960 also resulted in considerable expropriation of private assets by the state. Expropriation of land was the particular objective of the Algerian government between 1971 and 1980. In 1971, the Chilean government expropriated US copper mining assets reputed to be worth more than $500 million at the time. Such expropriations continue to the present day as evidenced by the Zimbabwean government's program of forceful land redistribution since 2000.

All of these examples underline the contemporary and historical relevance of the material that follows.

3.1.1 Framework

We begin with a simple framework that includes the benchmark model of production from Section 2.

There are N identical producers. Each producer produces $x(\tau) \equiv \gamma(\tau) + z$ where $\gamma(\tau)$ is produced output, z is nonproduced output (e.g., natural resources), and τ is the rate of expropriation. The profit function of a producer is:

$$\pi(\tau) = \max_{e \geq 0} \left\{ (1-\tau)\left(A\sqrt{e} + z\right) - e \right\} \tag{53}$$

with optimal effort $e(\tau) = [(1-\tau)A/2]^2$ and expected output $\gamma(\tau) = (1-\tau)A^2/2$ as in Section 2.1.

We now suppose that there are M *coercive authorities* who together determine τ—the rate of expropriation. At this level of abstraction, we can think of such authorities in quite broad terms as states, powerful landlords, feudal barons, or roving bandits.

A coercive authority is distinguished by having access to a technology for expropriating the output of producers. Let T_j be the resources committed to expropriation by authority j. Collectively these actions determine the level of expropriation experienced by producers. We model this for the moment as a common resource problem with the aggregate expropriation rate being

$$\tau = \sum_{j=1}^{M} T_j, \tag{54}$$

the *sum* of the actions of the expropriating groups.[34] This is a very specific technology and one could consider others. But it serves to fix ideas about some of the basic issues that arise when studying the equilibrium level of expropriation.

Each coercive authority tries to capture a share of total output. We assume that the expropriation rate is common across both types of output and all producers, and hence expropriation cannot be targeted to specific production activities.

Aggregate output is simply N times output *per capita* and is denoted by:

$$X(\tau) = N[\gamma(\tau) + z]. \tag{55}$$

This is clearly decreasing in τ. For future reference, the aggregate produced output and natural resource output are $Y(\tau) \equiv N\gamma(\tau)$ and $Z \equiv Nz$, respectively. We now explore the determination of τ under different assumptions to investigate the kinds of factors that will lead to different levels of equilibrium expropriation.

3.1.2 Commitment

We start by assuming that the coercive authorities can commit to an expropriation level up front. This is built into the following timing structure:

1. Coercive authorities choose $T_1, \ldots, T_M$
2. Producers put in their effort e
3. Output is realized and expropriation takes place

We now look at the equilibrium of expropriation as determined by a Nash equilibrium between the coercive authorities. These could be thought of as "roving bandits" in the sense of Olson (1993). The history of Europe is replete with marauding groups such as the Vikings and the Magyars that plundered from whatever sources they could find in the absence of a strong sovereign. We assume that expropriation is costly and let αN be the (constant) marginal cost of expropriation. We have made this increasing in N so that having a large group of producers to expropriate is more costly. We have also assumed that each producer has the same expropriation cost. This can be motivated by supposing that αN is equal to an outside wage determined by some kind of productive activity in which organizers of coercive authorities can otherwise engage. Having a more productive economy will then make expropriation more expensive.

The payoff of the jth coercive authority is:

$$T_j(X(\tau) - \alpha N) = NT_j(\gamma(\tau) + z - \alpha). \tag{56}$$

Thus the "profit" of a coercive authority comes from the outside wage rate that determines the opportunity cost of expropriation. The trade off for coercive authorities is quite standard. An increase in expropriation increases profits assuming that $\gamma(\tau) + z > \alpha$, but leads to each producer lowering his effort. The optimal rate of expropriation balances these two factors. A necessary condition for a positive rate of expropriation is that $(A^2/2) + z > \alpha$. This says that there have to be sufficient resources to plunder relative to the cost of expropriating. We assume that this is the case from now onward.

The Nash equilibrium in expropriation levels has all coercive authorities choosing T_j simultaneously. This yields first-order conditions, assuming an interior solution, of:

$$T_j\gamma'(\tau) + \gamma(\tau) + z = \frac{-T_jA^2 + (1-\tau)A^2}{2} + z = \alpha. \tag{57}$$

Since all authorities have an identical expropriation technology, it is natural to focus on a symmetric outcome. It is straightforward to show that the overall expropriation rate τ, assuming an interior solution, is then given by:

$$\tau = \left(1 + \frac{2(z-\alpha)}{A^2}\right)\frac{M}{M+1}. \tag{58}$$

There are three immediate comparative static results that are straightforwardly derived for this simple problem and will serve to organize our thinking about the organization

of coercion. These will look at how the level of expropriation varies with the number of coercive authorities (M), the level of natural resources per producer (z), and the cost of coercion (α).

Our first result comes from seeing how τ depends on M—the number of coercive authorities. Totally differentiating Eq. (58) yields

$$\frac{\partial \tau}{\partial M} = \left(1 + \frac{2(z-\alpha)}{A^2}\right) \frac{1}{(M+1)^2} > 0. \tag{59}$$

This yields:

Result 9 (Monopoly of force). *Output is highest and expropriation lowest when there is a monopoly on coercive authority.*

This result follows from the observation that competitive determination of expropriation rates creates a commons problem. Each coercive authority fails to internalize the effect of its expropriation decision on others. States that are fragmented, that is, where coercive authority is wide spread will tend to be poorer according to this logic. This corresponds to the kind of fragmentation that is frequently referred to in the context of weak states—see, for example, the discussion in Acemoglu (2005).

This result goes back a long way. It underpinned Hobbes' concept of Leviathan and Weber's concept of the state in which a single state authority monopolizes the power to coerce. The simple model that we have setup shows that this has a rationale in terms of efficient organization of production. Olson (1993) puts this point colorfully as follows:

> **In a world of roving banditry there is little or no incentive to produce or accumulate anything that may be stolen and, thus, little for bandits to steal. Bandit rationality, accordingly induces the bandit leader to seize a given domain . . . and to provide a peaceful order . . . thereby obtaining more in tax theft than he could in migratory plunder. (p. 568)**

Just how monopoly of coercion can be achieved is not clear. One could think in terms of a creating a state with the power to prevent all other actors in the economy from exercising coercive power. This certainly represents the situation that we see in many advanced states in the world. But the monopoly outcome could also be achieved by finding some kind of Coasian arrangement among those who possess the power to expropriate. These authorities could, in principle, bargain with one another to achieve the monopoly outcome and then use transfers among each other to achieve the cooperative outcome. However, practical experience suggests that states that have broken down find such cooperative outcomes quite difficult to sustain.

One way to achieve an outcome equivalent to monopoly expropriation is via a system of monopoly franchises (chieftains). A good example is the Zamindari system of land taxation in India where powerful landowners were given the power to expropriate

from particular tenants. The "franchise" arrangement can be thought as defining property rights by the coercive authorities. Let N^j be the group of producers assigned by such property rights to the jth coercive authority. Then the optimal expropriation decision maximizes:

$$T_j\left[N^j(y(T_j)+z)\right]-\alpha N^j T_j. \tag{60}$$

This effectively achieves the Coasian outcome among the chieftains by assigning property rights to the coercive authorities, thereby overcoming the common pool problem.[35] But there is an issue of how such rights are defined and enforced in the absence of some kind of super coercive authority. In the case of the Zamindars in India, it was the British who used them as agents of colonial rule.

If there are many coercive authorities, then one issue is whether competition between them works as a further restraint on expropriation. This will happen only if there is mobility of producers across coercive domains. One feature of many low income economies is that such mobility is either naturally or artificially limited. Moreover, we would expect coercive authorities to strategically limit mobility in order to maintain the power to expropriate resources. Thus in many parts of Africa, systems of land tenure and passage of land across generations are set up to reduce mobility. This has a short-term logic for those who operate such systems. However, in a dynamic perspective, it clearly has a cost if expropriation levels are too high.

Our second result looks at how expropriation varies with the extent of nonproduced output (natural resources). Here, it is straightforward to see that:

$$\frac{\partial\tau}{\partial z}=\frac{2}{A^2}\frac{M}{M+1}>0. \tag{61}$$

This result can be interpreted as follows:

Result 10 (Resource curse). *A higher level of non-produced output leads to more expropriation and hence less output overall.*

This result is driven by the fact that such expropriation in this case does not create any disincentive effect. It mirrors a wide variety of empirical findings suggesting that resource richer countries find it difficult to establish regimes in which expropriation is limited (see, e.g., Mehlum, Moene, & Torvik, 2006 or Sachs & Warner, 2001).

Finally, we can look at the effect of an increase in α. This has at least two possible interpretations. One sees it as reflecting improvement in outside productive options among those who have the power to coerce. This would be the case in a more productive economy where wages are higher. The other is an improvement in systems of formal property rights protection, for example, by undertaking reforms of legal protection with an independent judiciary to protect the rights of producers. This would make

exercising private coercive power more costly. Differentiating Eq. (58) with respect to α yields:

$$\frac{\partial \tau}{\partial \alpha} = -\frac{2}{A^2}\frac{M}{M+1} < 0. \tag{62}$$

This yields:

Result 11. *An increase in the cost of coercion and/or the benefits to non-coercive activities increases produced output and reduces expropriation.*

This result ties our model to some general equilibrium approaches to rent-seeking in which coercive activity is affected by the level of economic development in general. Many authors have argued that a key role of institutions is to set the relative reward structures for different kinds of economic activities. Baumol (1990) and Murphy, Shleifer, and Vishny (1991) have argued that entrepreneurial talent can be reallocated toward rent-seeking and organized crime when the returns to such activities are high relative to producing. Even in advanced democracies, these authors emphasize that the legal system can be a device for organized rent-seeking which reduces production.[36]

3.1.3 No commitment

The simplest way to capture the inability to commit in this model is to suppose that τ is chosen after the effort decision by the producers. Throughout, we study the case of a monopoly coercive authority and, for simplicity, set $\alpha = 0$. The timing of moves that we consider is:

1. Producers put in their effort e.
2. The coercive authority chooses τ.
3. Output is realized and expropriation takes place.

We consider a subgame perfect Nash equilibrium in this game. It is straightforward to see that in a one-shot setting we have:

$$\tau = 1 \quad \text{and} \quad e = 0. \tag{63}$$

This yields the obvious but important insight:

Result 12. *Without commitment in a static setting, the level of expropriation is one-hundred percent and produced output is zero.*

The logic is simple: for any $\gamma(\tau) \geq 0$, the coercive authority will set $\tau = 1$.[37] Anticipating this, the producers will commit no effort and produced output is zero.

This fits well the idea of a state that is "overstrong against thyself" following De Long (2000) who quotes the poet John Milton in this context. The outcome in this equilibrium is Pareto inefficient for low enough z. This is because there is a level of expropriation $\tau < 1$ which makes both producers and the coercive authority better

off from an *ex ante* point of view. The question is how to solve the commitment problem so that Pareto gains can be reaped. Unless noted otherwise, to make things as stark as possible we focus on the case where $z = 0$. We now explore five ways in which an outcome with $\tau < 1$ can be obtained: reputation, exit, secrecy, ownership, and voice.

3.1.4 Reputation

The fact that coercive authorities have an incentive to develop a reputation for restricting the use of their expropriative activity is a central theme of the literature on security of property. This has been applied to the problem of limiting state power by Grossman and Noh (1994) among others. We illustrate this in the conventional way—thinking of producers and the coercive authority as being in a long-run relationship. This means that the producers can "punish" the coercive authority for expropriating them excessively by ceasing to produce for some specified period. But for long-run relationships to work to secure property in the way that this suggests, it must be that there is some long-run entity called the state that can take a far-sighted view. Olson (1993) characterizes the state in such contexts as a "stationary bandit." The fact that the state is stationary means that it is able to take a long-term view. He describes this idea as follows:

> **A stationary bandit will therefore reap the maximum harvest in taxes . . . only if he is taking an indefinitely long view and only if his subjects have total confidence that their "rights" to private property . . . will be permanently respected. (p. 571).**

One feature that separates weakly and strongly institutionalized political systems is the extent to which they have long-lived political institutions that can be used to sustain reputational outcomes. For example, strongly institutionalized settings often have parties with long-term political ambitions and hence an incentive to build reputations. Olson (1993) emphasizes that this desire for the longest possible time-horizon was embodied in the familiar refrain "long live the King." Just how relevant these ideas are in practice, is moot. Clearly forward-looking behavior has to apply across generations of politicians. Moreover, the data suggest that, if anything polities with long-lived politicians and parties holding office tend to have less secure property rights.

To study the role of reputation in the simplest possible way, suppose that there is an infinitely repeated interaction between the coercive authority and the producers. There is production at each date and the coercive authority chooses τ at each date. In such situations, the coercive authority can be punished by producers if it chooses to expropriate them more than promised.

We solve the ensuing infinitely repeated game by supposing that producers and the coercive authority use simple history-dependent stationary trigger strategies whereby producers set $e = 0$ after any history of play in which a coercive authority sets $\tau = 1$. Let the promised expropriation rate be $\hat{\tau}^*$. We assume that producers set $e = 0$ after any history of play in which the coercive authority chooses $\hat{\tau}^* < \tau \leq 1$. We assume

that the coercive authority discounts the future with discount factor $\beta \in [0, 1]$. This could be interpreted in the standard way as a part of preferences or it could be thought of as representing a "political" discount rate reflecting how likely will be the turnover of the current government. We will study strategies of expropriation that are credible in the sense that if a coercive authority promises such a rate, it will be in its interest to honor that promise. Hence, along the equilibrium path, there will not be any expropriation beyond the promised level and producers will commit effort levels consistent with this.

To see what levels of expropriation are sustainable, consider the "value function" of the coercive authority after it has deviated to maximal expropriation, that is, set $\tau = 1$, following a "promised" expropriation rate of $\hat{\tau}^*$. As noted before, for simplicity we set $z = 0$; since producers are assumed not to affect the flow of nonproduced revenue, their behavior cannot change depending on the actions of the coercive authority, on or off the equilibrium path. We will however comment later on how the results are affected when $z > 0$. The discounted expected payoff of the coercive authority following a deviation is:

$$\overline{V}(\hat{\tau}) = Y(\hat{\tau}). \tag{64}$$

It represents the fact that the coercive authority seizes all of the output and producers respond by setting $e = 0$ ever after. This represents a rather crude expropriation technology where the coercive authority is only able to expropriate everyone or no-one. We discuss what happens when producers can be treated differently below.

If the coercive authority has not "cheated" by reverting to $\tau = 1$, then its "value function" along the equilibrium path with an expropriation rate of $\hat{\tau}$ is:

$$\hat{V}(\hat{\tau}) = \frac{\hat{\tau} Y(\hat{\tau})}{1 - \beta}. \tag{65}$$

An expropriation level $\hat{\tau}$ is credible if it does not pay to deviate to $\tau = 1$. This will be the case if:

$$\hat{V}(\hat{\tau}) \geq \overline{V}(\hat{\tau}). \tag{66}$$

From this, we conclude that *an expropriation rate* $\hat{\tau}^*$ *is credible only if*

$$\hat{\tau}^* \geq (1 - \beta). \tag{67}$$

This expression says that promised expropriation has to be *high enough* to be credible. If the expropriation rate is low, then production will be high enough to tempt the coercive authority to maximally expropriate the producers. This result implies that a very

patient coercive authority (β close to one) can commit to any rate of expropriation and be credible whereas an impatient coercive authority (β close to zero) will only be able to commit to a high rate of expropriation.

Credibility is a binding issue for a coercive authority when it cannot promise an expropriation rate that maximizes its payoff. To see this, observe first that the payoff maximizing expropriation rate for the coercive authority in this context is:

$$\tau^* = \arg\max_{\tau \geq 0}\{\tau Y(\tau)\} = \frac{1}{2}. \tag{68}$$

The optimal *credible* expropriation rate maximizes the coercive authority's payoff subject to the credibility constraint, that is,

$$\begin{aligned} \hat{\tau}^* &= \arg\max_{\tau \geq 0}\{\tau X(\tau)\} \\ &\text{subject to} \\ \tau &\geq (1-\beta). \end{aligned} \tag{69}$$

If the credibility constraint is not binding, then $\hat{\tau}^* = 1/2$. Otherwise, $\hat{\tau}^* = (1-\beta) > 1/2$. Thus the per-period payoff to the coercive authority in a credible equilibrium is:

$$\hat{R} = \begin{cases} (1-\beta)Y(1-\beta) & \text{if } \beta < \dfrac{1}{2} \\ \dfrac{1}{2}Y\left(\dfrac{1}{2}\right) & \text{otherwise.} \end{cases} \tag{70}$$

This logic associates higher output and lower levels of expropriation with long-lived forms of coercive authority. Thus, as claimed by Olson, reputation acquired by stable autocrats (such as hereditary monarchies) may perform better than short-lived leaders. The key insight from this analysis is summarized as:

Result 13. *The credible rate of expropriation supported by reputation is characterized by* $\hat{\tau}^* = \max\{\frac{1}{2}, 1-\beta\}$ *and is therefore decreasing in the discount rate of the coercive authority.*

We have so far abstracted from the role of natural (unproduced) resources and their implications for the ability of a coercive authority to commit. However, it is straightforward to extend the above analysis to the case where $Z > 0$. In this case, $\overline{V}(\hat{\tau}) = Y(\hat{\tau}) + Z + \dfrac{\beta}{1-\beta}Z$ and $\hat{V}(\hat{\tau}) = \hat{\tau}(Y(\hat{\tau}) + Z)/(1-\beta)$. This yields $\hat{\tau} \geq (1-\beta) + \beta\dfrac{z}{z + \gamma(\hat{\tau})}$ implying that the share of national income that is earned from natural resources, $z/(z + \gamma(\hat{\tau}))$, affects the ability to commit. The higher that share,

then the higher is the credible expropriation rate, that is, the more difficult it is for the government to commit to a low level of expropriation. This reinforces the resource curse finding from the previous section. The presence of natural resources also affects the optimal expropriation rate. This is now $\tau^* = \frac{A^2 + 2z}{2A^2} \geq \frac{1}{2}$ which is increasing in z, the value of "natural resources" per producer.

The study by Guriev, Kolotilin, and Sonin (2008) of nationalizations in the oil industry around the world over the period 1960-2002 resonates with our analysis. They find that nationalization is more likely to happen when oil prices are high and the quality of institutions is low even when controlling for country fixed effects. When oil prices are high the temptation to expropriate is high (in terms of our model, this can be thought of as a high value of Z).

This analysis assumes that there is a single expropriation rate for all production whether it requires producer effort or not. However, it should be noted that if the government can separate out property rights to produced output and natural resources it will wish to do so. Moreover, the reputational mechanism studied here cannot explain how property rights over natural resources would ever emerge in equilibrium. But given that we observe protection of such property rights in the real world when it is fairly transparent that there are pure rents to be earned by the state, we need an alternative explanation than the kind of dynamic reputational model studied here.

More generally, developing a reputation as a means of enforcing property rights best fits with situations where there is no institutionalized restriction on coercive power. Thus, if it applies at all, this analysis is probably most relevant to some weakly institutionalized polities where there are no workable formal rules to limit coercion. The main lesson from history is that, if government is to turn over on a regular basis, then there is a need to move beyond personal reputations as a means of sustaining property rights protection. Thus, we now move onto understanding other ways of trying to limit coercive authority.

3.1.5 Exit

Another way of preventing coercive power being abused is the possibility that producers can exercise an exit option. Exit could take the form of leaving to take an outside option denoted by a utility level $\overline{u}$ or the ability to hide or leave with a fraction of output which we denote by μ.

This can make a difference to the expropriation level and hence output even when the coercive authority can commit. To see this, recall that in our benchmark static model where $z = 0$, then $y(\tau) = (1 - \tau)A^2/2$. Without any constraints, the coercive authority would choose $\tau = 1/2$. However, so long as the producer's payoff when $\tau = 1/2$ is less than $\overline{u}$ this is no longer feasible. In particular, for $\overline{u} \geq [A/4]^2$ the exit option will be a binding constraint and so the maximum feasible level of τ will be

set by $[(1-\tau)A/2]^2 = \overline{u}$. A similar result obtains when we allow the producer to leave with a fraction $1-\mu$ of his output with $\mu > 1/2$.

More generally, we can study the no commitment case when the producer can hide, destroy, or carry away a fraction $1-\mu$ of his output when threatened by expropriation. There is now a maximum tax rate denoted by $\overline{\tau} = 1-\mu$. This affects the outcome described in the last section in two main ways. First, after a deviation from the promised level of expropriation, the government can only capture $\overline{\tau}Y(\hat{\tau})$ rather than all of the output. Second, the upper bound on expropriation may also apply to the expropriation rate along the equilibrium path which we have labeled $\hat{\tau}$. Hence, it also provides an upper bound on expropriation.

The condition for a credible equilibrium level of expropriation when exit imposes a constraint on expropriation is:

$$\overline{\tau} \geq \hat{\tau}^* \geq \overline{\tau}(1-\beta). \tag{71}$$

This shows exactly how exit can permit the government to credibly commit to less expropriation. The maximum expropriation rate reduces the lower bound on $\hat{\tau}^*$. This makes it more likely that the coercive authority can commit to τ^*.

This analysis shows why a government might try to institutionalize exit options. One way to do this would be through decentralization where multiple governments compete and it is possible to leave one jurisdiction and move to another if expropriation is too high. Qian and Weingast (1997) refer to this as "market preserving federalism" which they argue has been relevant as a device to limit expropriation risk in the context of China.

From the perspective of the coercive authority, any exit rate which satisfies $\overline{\tau} \geq \tau^* \geq \overline{\tau}(1-\beta)$ would be optimal. Such exit options permit the authority to commit to the expropriation rate that maximizes its *ex ante* payoff.

However, national income and the welfare of producers would still be higher were it possible to increase exit above the level associated with τ^*. Nonetheless, a purely predatory government would not have an incentive to protect property rights above the level $1-\tau^*$. But arguably there are governments around the world that protect property rights to a point where the state has more or less dispensed with predation. Thus, we need to consider other explanations of the behavior of such states.

3.1.6 Secrecy

The commitment problem that leads to full expropriation is based on the assumption that the coercive authority can costlessly observe output. If this assumption is relaxed, it is possible for the commitment problem to be mitigated. To make this point as simply as possible, we consider a variant of our benchmark model. Let e now be discrete: $e \in \{0,1\}$. If $e = 0$ then output is y_0. Otherwise, output is $\overline{y}$ with probability p, and y

with probability $1 - p$, where $\overline{y} > \underline{y} > y_0$. Let $\hat{y} \equiv p\overline{y} + (1-p)\underline{y}$ denote expected output when $e = 1$.

To set $e = 1$, the producer incurs a cost c. Both effort and output are unobservable to the authority. However, by incurring a cost of γ the authority can observe output. The producer, in contrast, knows the level of realized output, but only after the effort decision is taken. If $\gamma = 0$ then output is costlessly observable. Then *ex post* it is always worthwhile for the authority to observe output and as above, it will always set $\tau = 1$. As a result, the producer will select $e = 0$ and no output will be produced.

As in the previous section, suppose $1 - \mu$ is the part of the output that is lost to the authority because the producer has some margins of choice. Our interpretation here is that producers can actually carry away and not just destroy a fraction $1 - \mu$ of the output. For $\mu < 1$, the producer will set $e = 0$ under the assumption that c is sufficiently high:

$$c \geq (1-\mu)(\hat{y} - y_0). \tag{72}$$

Therefore, the authority can gain an amount $R = \mu y_0$ from expropriation.

Suppose instead that $\gamma > 0$. Now whether to observe output is a matter of choice to the coercive authority. Suppose $\mu y_0 \geq \gamma$ so that for any output level it is worthwhile for the coercive authority to expropriate the producer if it wishes to do so. Would it be worthwhile for the authority to demand a flat amount t and observe and expropriate output only if the producer does not oblige, rather than always observing and expropriating output? We can interpret this as a fee in exchange for the promise not to expropriate. Is it possible that this would give the producers the incentive to choose $e = 1$ and the authority to partly capture the gains through the flat fee? There are two sets of incentive constraints. First, producers must prefer paying the fee to being audited and having their output expropriated. Second, the coercive authority must prefer accepting the fee from a willing producer to auditing and expropriating.

The producers' incentive constraints are:

$$\overline{y} - t \geq (1-\mu)\overline{y}, \quad \underline{y} - t \geq (1-\mu)\underline{y}. \tag{73}$$

The corresponding constraint for the coercive authority is:

$$t \geq \mu\overline{y} - \gamma, \quad t \geq \mu\underline{y} - \gamma. \tag{74}$$

As at the time when it decides whether or not to audit, the level of output is unknown to the coercive authority, the above two expressions can be replaced by a single one, namely:

$$t \geq \mu\hat{y} - \gamma. \tag{75}$$

Combining the relevant constraints yields the following condition for the incentive compatible fee:

$$\mu\hat{y} - \gamma \leq t \leq \mu\underline{y}. \tag{76}$$

Since the authority would prefer as high a fee as possible, then $t = \mu\underline{y}$.[38] Notice that if γ is small, the incentive constraint cannot be satisfied; the temptation to audit and expropriate is too high for the coercive authority.

We have to make sure that this fee is consistent with the producers' incentives to choose $e = 1$ which is the case so long as (using the fact that $t = \mu\underline{y}$):

$$\hat{y} - (1 - \mu)y_0 - \mu\underline{y} \geq c. \tag{77}$$

Notice that now all parties are strictly better off.[39] Therefore, making it feasible for its citizens to legally conceal some of their output can be Pareto-improving in this setting.

Some aspects of secrecy are enshrined in the relations between citizens and government in most modern democracies. While such democracies may now have the ability to commit not to expropriate in other ways, this may also reflect historical circumstance in which the evolution of these values about personal freedom were, in the first instance, efficiency enhancing and allowed the flourishing of the market economy. A good example of a modern day autocratic regime that has embraced some aspects of this in its pursuit of developing a market economy is China. Bai, Li, Qian, and Wang (2004) have emphasized the use of anonymous banking laws in China as a means of limiting the possibility of expropriation.

3.1.7 Public ownership?

We have so far assumed that all production remains in private hands. However, both historical and contemporary experiences suggest that we should take seriously the possibility of public ownership. Thus the state could nationalize all production and employ the citizens to work as wage laborers. In this case, all the surplus in production accrues to the state. Indeed, this is how expropriation has worked in socialist economies.

This section asks whether public ownership can solve the problem of imperfect private property rights. In this case, since the coercive authority is also the owner and residual claimant then perhaps all the problems that we have studied so far go away. This view would be correct if all effort into production were also put in by the coercive authority. However, that is not realistic. So the interesting case to study is where labor power remains private while land and other fixed assets are owned by the state.

If a socialist government could enforce the level of effort that maximizes output, which in our example is $e = A^2/4$ then national income would be maximal and socialism would be more productive than private ownership. Indeed, before it was

discredited by the experience of Russia and Eastern Europe, this was a frequent claim made by its proponents. But, as we shall see, this ignores the standard problem of how workers are to be motivated when they are not residual claimants.

One thing is clear immediately from our simple model. The question of the distribution of the surplus is a separate issue from efficiency if the state has the means to set $e = A^2/4$. The government may be the residual claimant or it could choose to leave the fruits of production in the hands of the workers. In the case of predatory government, public ownership without compensation would constitute complete but efficient predation now and forever.

But the socialist approach to predation breaks down if there are limited means for the government to induce effort. This will turn out to generate parallel problems to those that we have studied so far. To see this, suppose instead that effort e is private information. Then there is a moral hazard problem and the state has to offer citizens an incentive to work. The wage, w, is paid only if output is realized as a kind of "incentive payment."[40] Assume that the outside option of all workers is zero. In this case, the workers will set their effort at the level:

$$e^* = \arg\max_{e \geq 0} \left\{ \sqrt{e}w - e \right\} = \frac{w^2}{4}. \tag{78}$$

The government which now owns the land on which output is produced earns all of the expected surplus which is now:

$$\frac{w}{2}(A - w). \tag{79}$$

It is easy then to see that the optimal wage is $w^* = A/2$. The state and the worker share output equally in the event of a successful project.

It is now easy to see that there is a formal equivalence between what happens under socialization when the producers are paid a contingent wage and the case of predation under private ownership where $\tau \in [0,1]$ was the share taken of privately owned output. In the private ownership case, the coercive authority optimally sets $\tau^* = 1/2$ making the government's payoff under state and private ownership identical. Thus, in this setting, there is no way for public ownership to create either higher returns than a predatory state with private production or to increase output.

This symmetry between public and private ownership economies is maintained if we now introduce limited commitment under public and private ownership. Under socialism, the government would have an incentive to offer a wage of $A/2$ which it would then be tempted to set equal to zero after output is realized. As with expropriation of privately owned output, this would create an incentive constraint which would

make it impossible for the government to commit to the wage that was optimal from the point of view of offering incentives to workers. In the absence of commitment, the workers would set $e = 0$. The sustainable level of incentives under commitment problems would then be $w = \beta A$ which is obtained by equating $(w/2)(A - w)/(1 - \beta)$ and $\frac{w}{2}A$.[41] We would again have an identical outcome under public and private ownership.

So are there reasons to believe that retaining productive assets in private hands is more efficient as appears to be the case in practice? One possibility is simply that socialist economies have had trouble acknowledging the need for incentives at all. Indeed, in many socialist regimes, there has been aversion to incentives because they create *ex post* inequality when output is stochastic. This would imply that output would tend to be lower than under private ownership provided that private ownership economies can limit government expropriation. Of course, government might then appeal to non-monetary incentives such as working to support the motherland, etc.

3.1.8 Voice

By far the most important development in government in the past two centuries has been the development of systems of representative government in which citizens have a say in how private property rights are supported. In this section, we will discuss how institutional arrangements that enhance the power over decision making of producers may affect property rights protection.

To study this as simply as possible, suppose that the policy maker puts a weight of λ on the utility of producers. This sidesteps the issue of modeling the micro detail of political institutions. This objective function of government could represent the outcome of some kind of probabilistic voting model along the lines laid out in Persson and Tabellini (2000) or a lobbying model along the lines of Grossman and Helpman (1994).[42] Either way, this is consistent with the idea of a "property owning democracy" where owners of assets have a say in government policy. That said, this formulation might also crudely capture how preferences are aggregated in an autocratic setting. The mechanism could also mirror what would happen if a country were ruled by a more benevolent autocrat who was either fearful of an uprising or genuinely interested in the well-being of its citizens. In the limiting case where $\lambda = 1$ whoever controls the government values its own rents and the utility of producers equally.

The payoff of the coercive authority is now given by:

$$R(\tau) + \lambda N\pi(\tau) = \frac{N}{2}\left(\tau(1-\tau)A^2 + \lambda\frac{(1-\tau)^2A^2}{2}\right). \tag{80}$$

In a static model without commitment, the government would now choose a level of expropriation of private production after effort e has been sunk that maximizes:

$$\tau(\lambda) = \arg\max_{\tau \geq 0} \left\{ [\tau + \lambda(1-\tau)]\sqrt{e}A - \lambda e \right\} = 1 \tag{81}$$

as long as $\lambda \leq 1$. Thus, this formulation still leads to full expropriation in a static setting.[43]

Observe that, in this case, the coercive authority would *like to* commit to the expropriation rate:

$$\tau^* = \frac{1-\lambda}{2-\lambda}, \tag{82}$$

which is decreasing in λ and equal to 0 for $\lambda = 1$. For $\lambda = 0$, we get the solution that we studied in Section 3.1.4.

In a dynamic model, the value of λ affects the level of property rights protection that the coercive authority can credibly commit to. To see this, we now repeat the logic from above and consider what fixed rate of expropriation, $\hat{\tau}^*$, along the equilibrium path is credible. The condition for no expropriation beyond the promised level to be credible becomes:

$$\frac{R(\hat{\tau}) + \lambda N \pi(\hat{\tau})}{1-\beta} \geq Y(\hat{\tau}) - \lambda N e(\hat{\tau}) = N\left(\left(1 - \lambda\frac{(1-\hat{\tau})}{2}\right)\frac{(1-\hat{\tau})A^2}{2}\right). \tag{83}$$

Solving this equation, we find that the expropriation rate is credible only if:

$$\hat{\tau}^* \geq 1 - \frac{\beta}{1 - \lambda + \beta\lambda/2}. \tag{84}$$

Observe that if $\lambda = 0$, then we are back to the condition in Eq. 5. It is clear from this that for all $\lambda \geq \hat{\lambda} = (1-\beta)/(1-\frac{\beta}{2})$ the coercive authority can credibly commit to any expropriation rate. Observe that $\hat{\lambda} < 1$—so a democracy in which the government values its own rents and the payoff to citizens equally, that is, $\lambda = 1$, will always fully protect their property rights. For any fixed β, a higher value of λ increases the range of expropriation rates that the coercive authority can commit to *ex ante*. Thus, modeling voice in this way does relax the expropriation incentive constraint of government.

This argument illustrates in a very simple way why institutions that force decision makers to weight the welfare of producers can lead to a lower expropriation threat and hence increase output in the economy. It explains why it could be in the interests of a powerful autocrat who cannot commit to invest in institutions that reduce its power.

These theoretical findings are consistent with the crude cross-sectional observation that democracies tend to be richer than autocracies on average. However, it is clear that

there is likely to be a two-way relationship. Indeed, there is a large and growing literature on this issue.[44]

There are a number of historical episodes that resonate with this. It can, for example, explain the gradual and peaceful transition toward democracy in the United Kingdom which was initiated through concessions toward voting and establishing independent legal institutions charged with protecting property rights. Previous models, such as Acemoglu and Robinson (2000), have discussed the possible role of revolutionary threats in franchise extension. The current approach emphasizes that there can be a pure self-interest motive if the threat of expropriation is too great. Only if λ is higher can the state commit to lower rates of expropriation. This could be particularly important when other institutional changes increase political turnover and hence reduce β. The model does suggest that there will be a limit on this mechanism when it is controlled by the coercive authority. It will only have an interest in improving institutions encouraging producer voice up to the point where it can implement its own *ex ante* optimal expropriation rate. This is supported by institutions of voice, λ^*, such that:

$$\frac{1-\lambda^*}{2-\lambda^*} = 1 - \frac{\beta}{1-\lambda^* + \beta\lambda^*/2}. \tag{85}$$

For all $\lambda < \lambda^*$, increasing producer voice is Pareto-improving. However, for $\lambda \geq \lambda^*$, there is a conflict of interest between producers and the coercive authority.[45]

3.1.9 Heterogeneous producers

The analysis so far assumes all producers are treated symmetrically. However, it is possible that property rights are protected differentially across various social and economic groups. There are a number of possible sources of heterogeneity suggested by the model so far. The logic of the analysis above suggests, for example, that producers with greater access to exit opportunities (lower $\overline{\tau}$) and with more influence (higher λ) will suffer less from expropriation.

However, in the context of the reputational mechanisms that we have explored, an important issue is how far a coercive authority can selectively expropriate one group without undermining the trust of others. This depends in part on information flows across groups. In particular, the question is to what extent one group gets to see any expropriation of the other group. If one group can be secretly expropriated, then that should not undermine the confidence of the other. This suggests the possible role of a "divide and rule" strategy.[46]

To illustrate the power of this mechanism to limit expropriation, suppose that there are two groups $J \in \{A, B\}$: those with high exit options (A) and those with low

exit options (B). If the state deals with each group separately, then the credibility constraint is:

$$\hat{\tau}_J \geq (1-\beta)\overline{\tau}_J, \text{ for } J = \text{A}, \text{B}. \tag{86}$$

Suppose now that a deviation on either group results in *both* groups believing that the coercive authority has cheated on its promise, and that henceforth it will expropriate both groups at a common rate. This implies that if the coercive authority chooses to maximally expropriate one group, it will always maximally expropriate the other group as well, since it will be punished by both groups anyway. This can work only if there are good information flows between the groups (e.g., via the media). Then the incentive constraint becomes:

$$\hat{\tau}[Y^{\text{A}}(\hat{\tau}) + Y^{\text{B}}(\hat{\tau})] \geq (1-\beta)[\overline{\tau}_{\text{A}} Y^{\text{A}}(\hat{\tau}) + \overline{\tau}_{\text{B}} Y^{\text{B}}(\hat{\tau})] \tag{87}$$

or

$$\hat{\tau} \geq (1-\beta)\left[\overline{\tau}_{\text{A}}\frac{N_{\text{A}}}{N} + \overline{\tau}_{\text{B}}\frac{N_{\text{B}}}{N}\right]. \tag{88}$$

This relaxes the incentive constraint of the coercive authority.[47] The intuition is simple: if it cheats on its promise to group B, in addition to producers in group B, the producers in group A punish it as well, thereby increasing the cost of cheating.

If the goal of the political system is to reduce the aggregate level of expropriation, this analysis suggests the importance of two sets of institutions. First, as we already mentioned, those that permit free flow of information; and second, solidarity mechanisms in which *any* kind of expropriation by the coercive authority is treated as if it is an expropriation of everyone.

3.1.10 Taxation and expropriation

In our discussion so far, we have not talked about taxation and how it relates to expropriation. To libertarians taxation is a form of expropriation.[48] *Ex post*, it might seem it is a matter of semantics as to whether taking away money from private citizens is called taxation or expropriation. Also, even from an *ex ante* point of view, in our framework where everyone is risk neutral, whether τ is a tax rate, or the expected probability of expropriation, seems equivalent so long as these are known before e is chosen.[49]

If we look across countries of the world, there actually seems to be a positive correlation between protection of property rights (as measured using the ICRG expropriation risk measure) and the share of taxation in GDP from Baunsgaard and Keen (2005).

Figure 3 Expropriation risk and tax revenue.

This is illustrated in Figure 3, averaging tax revenue (as a percentage to GDP) between 1975 and 2000 and the ICRG expropriation risk score (scale 0-10) averaged between 1984 and 1997. As argued by Besley and Persson (2007), this type of pattern reflects the fact that countries with more developed fiscal systems tend to be richer and, on the whole, more market oriented. It brings into sharp relief the idea that expropriation of property (and not taxation) is symptomatic of a low level of development.

A key feature of tax systems is precisely that they lay down clearly defined rules and enable the citizens to determine their actions accordingly. Unlike expropriation, taxation is typically an organized and systematized form of extraction from citizens. Tax systems typically involve published codes according to which government tries to commit not to levy them *ex post* or to discriminate across producers on an *ad hoc* basis. A key issue is what enables the government to make this commitment. A natural starting point is the reputation-based story: we can equate expropriation with government seizing all of the output from the producers while taxation is the limited expropriation $\hat{\tau}^* < 1$. This distinction between expropriation and taxation is consistent with Weingast (1997) which argues that a feature of liberal political institutions (particularly democracy) is to create "fundamental transgressions"—lines in the sand which cannot be traversed without coordinated punishments. It emphasizes that there is need to have transparent access to information on expropriation by government to give the citizens a means to punish governments that violate their property rights.

There is another important difference between taxation and expropriation. Even if we allow for the possibility that taxes too can be subject to *ex post* changes, blurring the line between taxes and expropriation from the commitment point of view, an important issue is whether the producer can withdraw the asset from production. For example, in the case of land, it can lie fallow. However, a coercive authority that has the power to expropriate the owner of his assets, as well as any output that results from it, does not face this constraint. In principle, the coercive authority can force the asset to be brought into production. Using our previous arguments on reputation and exit options we can show that this means even with imperfect commitment, taxation will provide better incentives than when the coercive authority has the power to expropriate assets (in addition to output).

To see this formally, suppose there is a discrete decision denoted by $\delta \in \{0, 1\}$ which denotes whether the asset is used at all. We assume now that the production function is:

$$\delta[A\sqrt{e} + z]. \tag{89}$$

So if $\delta = 0$, nothing is produced, while if $\delta = 1$, then there is output of z even if $e = 0$. When the coercive authority cannot expropriate assets then, the "punishment" that the coercive authority faces if it takes away all the output from the producer is that output will be zero forever. However, if the coercive authority can expropriate assets, then output will be z each period. In the former case, the credible level of expropriation (of output) is $\hat{\tau} \geq 1 - \beta$. In the latter case, it is $\hat{\tau} \geq (1 - \beta) + \beta(z/(z + y(\hat{\tau})))$, which is clearly higher than in the former case.

This argument is even stronger in modern economies given the importance of inalienable human capital (e.g., Grossman & Hart, 1986).[50] To illustrate this formally, suppose that in the event that the government sets $\tau = 1$, the producer can withdraw value equal to $1 - \mu$ from private production in the form of inalienable specific human capital. Then the maximum share of output that can be expropriated is equal to μ and, in the dynamic context, the incentive constraint for the government becomes more relaxed, namely, $\hat{\tau}^* \geq (1 - \beta)(1 - \mu)$.

3.1.11 Cross-sectional empirical regularities

The models that we have developed above give a crude sense of why, in cross-sectional regressions, we might find institutional and economic variables that can explain the extent of expropriation risk by government. Two things come rather directly out the analysis above. First, we should expect more stable governments with institutions that constrain government and enhance voice to have better property rights protection. Second, we should expect countries with high levels of natural resources to have weaker property rights protection.

Table 1 looks at these ideas using the ICRG expropriation risk variable averaged between 1984 and 1997 as the dependent variable. This was used to construct Figures 1 and 3 above. The variable is on a 0-10 scale with 10 denoting the highest level of property rights protection. Its mean is 7.3 and its standard deviation is 1.7.

We use three different institutional variables as independent variables in cross-country data for the year 1997.

Our first institutional measure is the extent of executive constraints as measured in the Polity IV data. This variable has a value of 7 when such constraints are strong. We create a dummy variable equal to one when countries score 7 and take the average value of this variable between 1945 and 1997. Its mean is 0.24 and its standard deviation is 0.29. The first column of Table 1 shows that this is negatively correlated with expropriation risk and is significant at 1%. A one standard deviation in this measure of institutions leads to little less than half a standard deviation change in expropriation risk.

There is no direct measure of the government discount factor. However, Acemoglu, Johnson, and Robinson (2001) motivate their use of settler mortality to explain weak property rights use an argument in terms of incentives to set up long-term and short-term (extractive) institutions. As we have seen above, long-termism should lead to better property rights protection. The variable "settler mortality" has a mean of 245 and its standard deviation is 469. The second column of Table 1 shows the results for 64 former colonies for which this variable is available. As shown by Acemoglu, Johnson, and Robinson (2001), there is a negative correlation between settler mortality and expropriation risk (significant at 1%) with a one standard deviation change in settler mortality associated with a around one third of standard deviation change in expropriation risk in this subsample.[51]

Another likely factor that shapes short-termism in government behavior is the incidence of civil war. Civil war could also be a proxy for more fragmented political authority as war lords may gain control of some parts of a country. Here, we use a variable derived from the Correlates of War data base. It is the average number of years between 1945 and 1997 that a country has been engaged in a civil war. Its mean is 0.06 which says that in 6% of the country years on average in our sample are in civil conflict and its standard deviation is 0.12. Third column of Table 1 shows again there is a positive correlation between the prevalence of civil war and expropriation risk which is significant at 1%. In this case a one standard deviation change in the average civil war variable is associated with a around a third of a standard deviation change in expropriation risk.

To investigate the resource curse effect on property rights, we use a dummy variable which is equal to one if a country is an oil exporter. The mean is 0.12 and the standard deviation is 0.32. The fourth column of Table 1 shows that there is a positive correlation between expropriation risk and being an oil exporter which is significant at

10%. Being an oil exporter increases expropriation risk by half of one standard deviation.

The fifth column includes all these variables together on the sample of colonies for which settler mortality data is available. The correlations that we uncovered in the earlier columns remain significant with the exception of the oil exporter dummy variable.

While only suggestive, these findings support the relevance of the underlying theoretical reasoning that we explored throughout this section. The link between these reduced form correlations and specific theories is tenuous and one challenge for future empirical work in this area is to forge a closer link between theory and data.

3.2 Improving state effectiveness

Effective states in the current context are those that support institutions that allow households and firms to enjoy secure property rights. This constitutes a key investment in state legal capacity of the kind emphasized in recent work by Besley and Persson (2007, 2008). They formulate a dynamic model where such investments are forward looking and state capacity accumulates over time. For simplicity of exposition, we will focus here on a simpler static approach. This will emphasize how heterogeneous interests, and the way that these are mediated through political institutions, shape the decisions that states make to improve property rights protection.

To formalize this, we need a cost function which maps public expenditures on market supporting property rights into lower τ in the notation of this chapter. Concretely, these costs can be thought of as the resources needed to fund courts and property registries. We will black box this by simply writing this cost function as $L\ (1 - \tau)$ where $L\ (\cdot)$ is an increasing, convex function measuring the *per capita* cost of improving property rights at an economy wide level. This function could vary across countries due to different legal traditions and hence could constitute the way in which legal origins along the lines of La Porta., Lopez-de-Silanes, Shleifer, and Vishny (1998) enter the determination of market supporting property rights.[52] For example, if common law countries are better at protecting asset owners from encroachment on their rights or in enforcing some kinds of contracts, then $\partial L(1 - \tau)/\partial\tau$ could be lower in these cases, that is, a lower marginal cost of delivering a given level of property rights protection.

Funding $L\ (1 - \tau)$ can be through either general taxation or a set of user fees, for example, paying to register property or to use the court system. Deciding on the method of finance is a societal decision which will have implications for the level of investment that is likely to take place. Also important for the decision to invest in the capacity to support effective property rights will be the way in which political institutions shape collective choice. This will matter most when there is significant heterogeneity in the population. The analysis so far has given many reasons why we would expect such heterogeneity in practice.

This section will lay out a rudimentary way of thinking about this and the insights that are aided by having the explicitly microfounded models from Section 2. However, it will be clear that improving state effectiveness in terms of property rights is not fundamentally different from any dimension of public spending that has an impact on productivity in the economy, such as extending education or building infrastructure. These also have to deal with issues that arise due to heterogeneous costs and benefits within the population.[53]

Another theme in this section will be the interplay between formal and informal institutions in providing legal services needed to support property rights. One aspect of low income countries is the role of social networks in ensuring that property can be used as collateral or traded. For example, traditional land rights in Africa often require that the lineage or tribal authority has jurisdiction in this domain. This can be important since the incentives of the state to provide property rights could depend on such private informal alternatives. After all, if informal provision is effective then there may be no need for any kind of state investment. We can think of this in the way that we suggested in Section 2.2.2 where we supposed that there was value of τ_N that is specific to the network with a value of τ_F where "F" stands for "formal" which is relevant in the market. The latter could then be improved by collective investments represented by the function $L\ (1 - \tau_F)$.[54]

In general, the case for state provision lies in extending the domain of trade. A legal system based on networks provides contract enforcement services only to members of that network creating a patchwork of different τ_Ns. In principle, the formal legal system τ_F could be available to all households and firms in the economy creating a common basis for trade. To the extent that τ_F is lower this will tend to foster arms-length trade which will raise output.

3.2.1 A simple benchmark

To illustrate some of the issues involved in a simple and stylized way, we will work with the model of Section 2.2.1. While this was motivated as a model of expropriation risk rather than market supporting property rights we can use the interpretation that improving the court system allows better protection against claims by others to the fruits of the output. We will suppose that among the N producers there are different levels of productivity or land holding represented by A_i with $i = 1, \ldots, N$. The payoff to typical producer is:

$$\pi(A_i, \tau) = \left[\frac{(1-\tau)A_i}{2}\right]^2 + \overline{e}. \tag{90}$$

Suppose that each producer were faced with the *per capita* cost of sustaining property rights protection paid via a general lump-sum levy on all producers. Producer *i*s preferred level of formal property rights protection would then be:

$$\tau^*(A_i) = \arg\max_{\tau\in[0,1]}\{\pi(A_i,\tau) - L(1-\tau)\}. \tag{91}$$

The fact that A_i and τ are complements implies that $\tau^*(\cdot)$ will be a decreasing function, that is, more productive producers will prefer better property rights protection (lower τ).

To make a prediction about the level of property rights protection that would be chosen in this economy, we need to know whose preferences are decisive in collective choices over τ. As a benchmark, we will consider the outcome of a median voter model where those that benefit from weaker property rights are a negligible fraction of the population and hence do not influence the choice of policy.[55]

Since preferences over τ are single-peaked, then a standard median voter model would predict that in a democracy, this will be the median value of A_i, denoted by A_m. Thus, according to this we will see $\tau^*(A_m)$.

In this simple case, the distribution of productivity in the economy (perhaps reflecting the underlying distribution of assets) would affect the location of the median voter and hence the level of formal property rights protection in the economy as a whole. This simple model could give a foundation as to why legal origins matter, if we think that it affects the function $L(\cdot)$. The median voter in a country with a lower marginal cost of property rights protection will tend to choose better property rights protection.

3.2.2 Extensions

Our median voter result is a useful benchmark result. However, there are reasons to be doubtful that it captures the full set of issues that are relevant to decisions to invest in property rights protection in reality. We will now discuss some departures from this benchmark and discuss how they may affect the result.

Many developing countries are not democracies and it is fanciful to think that the median producer could be most relevant for determining τ. Some form of elite rule where richer producers have more political power might seem more natural. If the elite were simply rich producers who use the formal legal system to protect their property rights, then we would expect giving them the right determining τ would actually increase property rights protection. So economies dominated by a producer elite may tend to toward higher output and greater income *per capita*.

However, another (and perhaps more plausible) interpretation of elite rule would be for the rentier class who live off the fruits of weak property rights have a say in political decision making. To make things simple, suppose that the rentiers act together in a unified way—a strong unified elite and do not face any cost from investing in the legal system (this remaining incident on the producers). Then, their payoff is:

$$\frac{\tau(1-\tau)}{2}\sum_{i=1}^{N}(A_i)^2. \tag{92}$$

It is clear that their choice of property rights protection would be $\tau = 1/2$ whatever the cost of investing. Whether this is greater or less than would be desired by the median producer is not immediately clear. However, for small enough investment costs and a higher enough level of productivity for the median producer, we would expect there to be a conflict of interest with more producer oriented polities favoring stronger protection of property rights compared to those run by the rentier class. While not clear-cut, this does give some presumption for believing that property rights protection would be better in more democratic societies. These findings are in line with some of the discussions of Engerman and Sokoloff (2002) and their discussion of the role of inequality in shaping a variety of policy choices. However, as argued by Acemoglu and Robinson (2005), there is the possibility that fear of a revolution could lead to a policy choice by the elite that is closer to that of the wider citizens. Both of these observations are consistent with our earlier discussion of the impact of democracy on expropriation risk.

The existence of networks may also have implications for the political economy of property rights protection. Some groups, for example, may be able to enjoy good levels of property rights by trading in networks and hence without recourse to improving state effectiveness. Models of oligarchic property rights as developed by Acemoglu (2003) and Braguinsky and Myerson (2007) can be thought of in such terms. In a world where the ruling elite enjoy privileged access to a superior level of τ_N, there may be little incentive to improve property rights for the wider economy (see Sonin, 2003). However, Besley and Persson (2008) argue that the force of this argument depends on the development of the tax system, since the ruling elite would be better off maximizing production efficiency and then taxing the benefits for its own ends. This is essentially an application of the Diamond and Mirrlees (1971) efficiency theorem. This kind of network-based argument presents a somewhat different reason why fragmented authority can be damaging to property rights development.

3.2.3 Empirical regularities

The theoretical discussion gives a feel for why there should be difference in states' effectiveness in supporting property rights. We would expect this to depend on the level of economic development (measured via the A_is in terms of the theory), the political institutions and the legal history which affects the workings of legal institutions. To explore this in a very preliminary way, Table 2 presents some cross-sectional regressions based on data from the World Bank's Doing Business Web site (http://www.doingbusiness.org). The variable that we look at is the one of property registration which tries to get at how easy it is to register property under the law.[56] While this is only a partial perspective on the issues that interest us, it is certainly indicative and is available for 172 countries. The variable that we use is the summary ranking of each country's performance across three indicators: cost, number of procedures, and time.

Table 2 Cross-sectional determinants of expropriation risk

	(1)	(2)	(3)	(4)	(5)
High constraints on the executive (Polity IV)	−2.249*** (0.515)				−1.545** (0.644)
Settler mortality		−0.001*** (0.000)			−0.001** (0.000)
Average years in civil conflict 1945-1997 (COW)			−5.359*** (1.238)		−3.029** (1.409)
Oil exporter				−0.790* (0.453)	0.122 (0.494)
Observations	123	64	129	122	61
R-squared	0.154	0.105	0.149	0.022	0.265

Notes: Dependent variable is Average Expropriation Risk from the International Country Risk Guide for years 1984-1997. Robust standard errors in parentheses: *significant at 10%; **significant at 5%; ***significant at 1%.

In the first column of Table 2, we correlate this variable with the log of income *per capita* and find a strong negative correlation, that is, countries with higher income levels have better systems for registering property. Of course, the direction of causality is hard to know. A one standard deviation change in log income *per capita* is associated with around 20 places in the country ranking.

In the second column, we look at the correlation with legal origins, with French legal origin being the omitted category. There are strong correlations with Socialist; Scandinavian and German legal origin all of which have better rankings compared to French legal origin. These findings are in line with La Porta et al. (1998).

The third column of Table 2 looks at the correlation with democracy using the Polity data for the period from 1945 to 2000. The variable that we use measures the proportion of years in the year 2000 for which the country has had a polity score greater than zero over this period. Moving from being continuously autocratic to continuously democratic over this period is worth around 45 places in the ranking suggesting that policies that enable property registration are superior in democracies (Table 3).

Finally, in the fourth column, we include all of these sets of variables. Although the magnitudes of the correlations change, the basic findings are robust.

Table 3 Cross-sectional determinants of property registration

	(1)	(2)	(3)	(4)
Log income *per capita*	−20.790*** (3.303)			−10.648*** (4.023)
English legal origin		−11.387 (8.953)		−0.953 (8.982)
Socialist legal origin		−32.951*** (9.835)		−40.314*** (10.606)
Scandinavian legal origin		−87.751*** (7.332)		−46.793*** (13.234)
German legal origin		−66.984*** (8.955)		−32.330*** (11.619)
Proportion of years in democracy 1944-2000 (Polity)			−44.550*** (10.729)	−28.369** (12.621)
Observations	130	169	172	130
R-squared	0.225	0.162	0.094	0.349

Notes: Dependent variable is a country's rank (1-172) on the World Bank Doing Business Web site for time, number of procedures and cost of registering property. Legal origin omitted category is French legal origin. Robust standard errors in parentheses: *significant at 10%; **significant at 5%; ***significant at 1%.

As with the earlier results, these are only suggestive correlations and they in no sense test the theoretical models that we have put forward. However, they hint at the possible empirical relevance of the ideas that we have laid out and breathe life into the theory. But much remains to be done to refine our understanding of these issues at an empirical level in a way that is linked to theory.

4. CONCLUDING COMMENTS

Market economies rely on the creation and enforcement of property rights. In this chapter, we have reviewed the ways in which property rights affect economic decisions, and the incentives for creating effective institutions for the protection of private property.

Economists have often approached the problem of designing public policies by taking the starting point of market failure—typically where a competitive market fails to internalize externalities or there is a lack of competition. But the study of markets rests

often on assumptions about effective property rights which cannot be taken for granted. The role of competitive markets in allocating resources is then quite limited. This observation is especially relevant in the context of financial markets given the importance of assets in supporting trade.

The issues studied in this chapter are, we believe, of first-order importance in studying the development process and there is now a wide variety of supporting evidence. Looking at the evolution of property rights also means integrating insights from historical experience. This chapter has, we hope, given a sense of the richness of the issues that are involved in studying the interplay between property rights and economic development. It also has created a unified analytical framework drawing from the literature on development economics, political economy, and economics of contracts and organizations. However, it has not been possible to cover things in as much depth as we would have liked to, nor have we been able to provide a thorough survey of the literature.

One key message that stands out is how one should be cautious in thinking about property rights extension in a monolithic way. The creation of effective property rights is heterogeneous in its impact and there are many potential mechanisms that can sustain property rights. This suggests that there should not be a "one size fits all" mantra of extension of private property rights, nor a blind faith that this is a magic bullet that will cure all economic ills.

End Notes

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1. See Barzel (1997) and Alchian and Demsetz (1972).
2. See, for example, Acemoglu (2003).
3. One of the earliest advocates of private property rights was Aristotle who thought that property would be more likely to be looked after if someone owned it or profited from it than if it were treated as common (Robbins, 2000 p. 18).
4. Changes in technology or demand that lead to a rise in the value of the asset are argued to be key drivers of emergence of private property rights (see North & Thomas, 1973).
5. See de Soto (1989, pp. 158-163) for a detailed discussion.
6. There is an overlap with the issues covered here and Baland, Moene, and Robinson (2008).
7. In principle, this could even apply to labor, for example, "forced" labor.
8. The natural question is, given this deadweight loss why does this form of imperfection in property rights exist? We will examine this question in detail when we endogenize τ.

9. A necessary condition for the existence of labor markets is property rights in one's own labor, that is, absence of slavery or other forms of coercive use of labor. In this chapter, we will focus on property rights in nonhuman assets, such as land.
10. This is just an application of the separation property of agricultural household models: with complete markets, individual preferences do not affect production decisions (see Singh, Squire, & Strauss, 1986). This is taking prices as exogenous. Otherwise, household preferences will affect production decisions when prices are endogenous: in economies where people value leisure a lot, wages will be high and this will clearly affect production decisions.
11. Since $A \leq 2$, $\tau \in [0, 1]$, and $\gamma \in [0, 1]$ these solutions for effort are both interior.
12. For the proof of (i), observe that the sign of the derivative $\partial\sqrt{e_1}/\partial\tau$ depends on the sign on $\gamma^2 A^2 \tau (2 - \tau) - 4$. Now $\tau (2 - \tau)$ is increasing in τ and the maximum value that it can take is 1. Therefore, the maximum possible value of $\gamma^2 A^2 \tau (2 - \tau) - 4$ is $\gamma^2 A^2 - 4$ but by assumption $4 - (\tau\gamma A)^2 > 0$ for all τ, A, and γ. For (ii) observe that the sign of the derivative $\partial\sqrt{e_2}/\partial\tau$ depends on the sign on $4 + \tau^2\gamma^2 A^2 - 8\tau$. Clearly, this is positive for low values of τ and negative for high values of τ. The proof of (iii) follows directly by applying the envelope theorem.
13. This follows from the assumptions that the asset that is subject to insecure property rights is also one where productive labor is used to generate income and the resource constraints are not binding.
14. See de Meza and Gould (1992) and Dixit (2004).
15. For example, landlords in India often leave their land fallow rather than leasing them out for fear of rights and control to tenants due the presence of tenancy laws that provide security of tenure to tenants and regulate rents. This prevents the land-poor from accessing land through tenancy and is viewed as an unintended negative consequence of the existing tenancy laws. See Hanstad, Haque, and Nielsen (2008).
16. There is now a large literature that focuses on the implications of credit constraints for the path of economic development. See, for example, Aghion and Bolton (1997) and Banerjee and Newman (1993).
17. Note that together these assumptions imply $\rho < 1$. Given that we have normalized the cost of effort to one, this is an assumption in the relative price of the input x relative to effort e.
18. In Besley and Ghatak (2008), we provide a more thorough microfoundation to this story using a costly state verification model.
19. In this case:

$$\pi = \sqrt{\frac{A^2}{4} + w(1-\tau)}\left(A(1+\Delta) - 2\sqrt{\frac{A^2}{4} + w(1-\tau)}\right) + w(1-\tau) - \rho.$$

20. Formally, the result follows by taking the derivative of r with respect to τ and observing that $(A^2/4) + w(1 - \tau) = e \leq 1$.
21. See Besley and Ghatak (2008) for further discussion of this.
22. This is standard in the literature following Grossman and Hart (1986). The transfers solve:

$$t^* = \arg\max\left\{\left(a\sqrt{e_A} + b\sqrt{e_B} - \overline{u}_A^A - t\right)\left(a\sqrt{e_A} + b\sqrt{e_B} - \overline{u}_B^A + t\right)\right\}.$$

23. Observe that $(1 - \lambda)(3 + \lambda)$ is strictly decreasing in λ. Also, it takes the value 3 for $\lambda = 0$ and the value 0 for $\lambda = 1$. Hence, $(b^2/16)(1 - \lambda)(3 + \lambda) \leq (3b^2/16) < (b^2/4)$ implying that $\hat{S}^A$ is less than S^*.
24. See Banerjee, Gertler, and Ghatak (2002) and Mookherjee (1997).

25. Here we assume symmetric Nash-bargaining and therefore $\tau = 1/2$. However, if we use asymmetric Nash-bargaining then τ can be any nonnegative number between 0 and 1 and will reflect the relative bargaining power of A.
26. See, for example, Lin (1988, 1992).
27. This result holds more generally, for example, when the investments are complementary (see Hart, 1995).
28. We have set $\overline{u}_B = 0$.
29. See Pande and Udry (2005) for a comprehensive review of this literature.
30. Di Tella, Galiani, and Schargrodsky (2007) study the formation of beliefs using the same data set and find that lucky squatters who end up with legal titles report beliefs closer to those that favor the workings of a free market. To the extent these beliefs encourage effort and enterprise, this could be an additional channel through which property rights might affect productivity.
31. Our assumption (1) rules out the possibility that *vis-a-vis* projects with low-expected returns, collateral is not a binding constraint.
32. There is a large literature on private enforcement, that is, when protection is provided by profit-maximizing organizations (see Dixit, 2004), and also, some research on private institutions for property-rights, including ones that fight against predation by the government (see Dixit, 2009).
33. Discussions of private property rights enforcement include Grief (2005) and Skaperdas (1992).
34. We will make assumptions to ensure that $\tau < 1$ in any equilibrium.
35. Note however, that this is not the first-best outcome: there is still the standard distortion of an output-based transfer scheme.
36. A general equilibrium model of rent-seeking has also been developed by Acemoglu and Verdier (1998).
37. Observe that if $\alpha > 0$ and $z = 0$, then the coercive authority can commit to $\tilde{\tau}$ such that:

$$Y(\tilde{\tau}) = N\alpha.$$

If $z > \alpha$, then we get the same equilibrium as with $\alpha = 0$.

38. We are assuming here that the coercive authority can credibly commit to audit and expropriate if producers offer to pay some $t' < t$ such that $\mu\hat{y} - \gamma \leq t'$. If this is not possible, then t will have to be set at the lowest level that is consistent with the constraint of the coercive authority, namely, $\mu\hat{y} - \gamma$.
39. If $\underline{\gamma} = \gamma_0$ then the argument goes through but the authority would have been exactly as well off as before, not strictly better off. This is why we chose this particular formulation.
40. There could also be a fixed payment which is paid to workers regardless of whether output is realized, but we have set this to zero as we are assuming that the aim of the government is to extract as much surplus as possible from the workers under socialism.
41. In the language of contract theory, the coercive authority is now using a relational contract. See Baker, Gibbons, and Murphy (2002) for a discussion in the context of firms and workers.
42. Garfinkel and Lee (2000) and Marceau and Smart (2003) have applied these ideas to issues related to those studied in this section. See also the historical discussion in Rajan and Zingales (2003).
43. In fact, we know from Kydland and Prescott (1977) that even a welfare maximizing government may have an incentive to announced time inconsistent taxation.
44. See Persson and Tabellini (2008) for a review and discussion of the issues.
45. The above condition holds with equality for $\beta \leq 1/2$. If $\beta > 1/2$, $\tau^* = 1/2$, and $\lambda^* = 0$.
46. See Acemoglu, Robinson, and Verdier (2004) for a model along these lines.
47. This is an example of a collective reputation mechanism, similar to the one studied by Greif (1993) for mediaeval traders in the Mediterranean. We have assumed that, even if there is no collective

punishment, the government commits to a common expropriation rate. Otherwise, the incentive constraint for the group with low exit options would be relaxed, while the one for the group with high exit options would be strengthened.

48. See Nozick (1974).
49. The fact that taxation is typically deterministic and expropriation stochastic is not the key distinction in our framework of risk-neutral producers. Indeed, here a mean-preserving spread in the tax rate or the rate of expropriation would raise efficiency so long as the producer is told which way the uncertainty is resolved before he undertakes effort. Consider a mean-preserving spread in τ such that it is $\overline{\tau}$ with probability p and $\underline{\tau}$ with probability $1 - p$. As the producer's expected payoff is $\frac{1}{4}(1-\tau)^2A^2$ which is convex in $1 - \tau$ it follows that he is better off with the random tax schedule. This is a well-known result in public finance—see Weiss (1976).
50. Haber, Maurer, and Razo (2003) argue that there is considerable proprietary knowledge of markets and technology in the Mexican oil industry. They argue that this limited the amount of expropriation that the government could undertake.
51. In an ingenious paper, DeLong and Shleifer (1993) look indirectly at property rights protection in Medieval Europe and find that absolutist monarchs presided over slower growth in urbanization.
52. See Glaeser and Shleifer (2002) for an interesting discussion of the historical political economy behind the development of different legal codes.

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